

Machine and Tool **BLUE BOOK**

A DIGEST OF THE METAL WORKING INDUSTRY

APRIL, 1949

THIS MONTH

Drillheads, Their Uses and
Characteristics

Fundamental Principles of Drawing Dies
Why Dies Break

Welding an 18-Spindle Drilling,
Forming Machine

NMTBA Sales Refresher Course

What's New in Metalworking

Available Literature

Advertisers' Products Index

Index to Advertisers

COMPLETE INDEX ON PAGE 5

A HITCHCOCK PUBLICATION

"MARVEL"...

Has The EDGE

MARVEL HIGH-SPEED-EDGE PATENTED
ARMSTRONG BLUM MFG. CO.
CHICAGO, ILL. MADE IN U.S.A.

MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high speed steel cutting edge electrically welded to an exceptionally tough, strong steel body.

The High-Speed-Edge does the cutting while the alloy hack with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin hole (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

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Tough unbreakable alloy steel body with hardened eyes.

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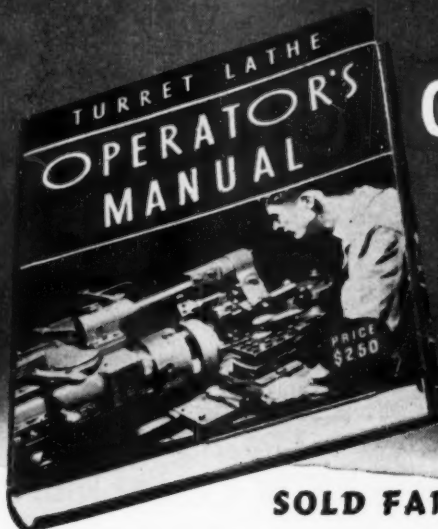
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"The Hack Saw People"

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A deluxe cloth-bound volume of 240 pages, with over 350 illustrations. Shows the how, what, and why of modern turret lathes. Easy to read, understand and remember! Covers all phases of setup and operation—speeds and feeds—methods and shortcuts—tool angles and setting.

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Department 320

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&
SWASEY**

Machine Tools
Cleveland

TURRET LATHES

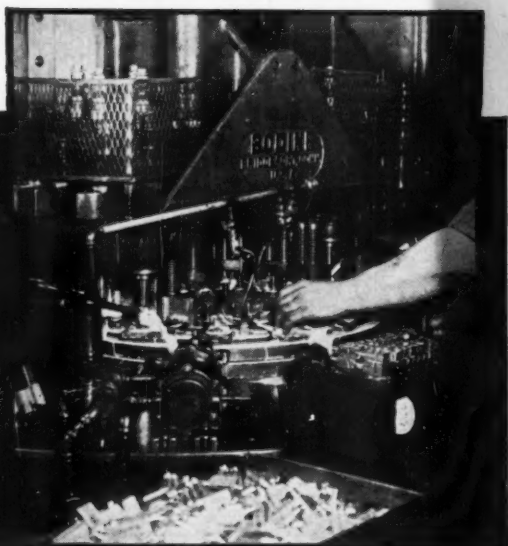
MULTIPLE AND SINGLE
SPINDLE AUTOMATICS—
PRECISION TAPPING AND
THREADING MACHINES

When Writing Advertisers Please Mention MACHINE and TOOL BLUE BOOK

1



Here's where
**"DOUBLING
IN BRASS"**
means



DOUBLING OUTPUT...or more

... and when we say "doubling" we are extremely conservative. In this case 8 different holes were drilled ... 2 also countersunk ... in a Brass Gauge Socket. Production 700 pieces per hour from the machine, 5600 operations per 50 minute hour.



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Bodine automatic Drilling, Milling, Tapping and Screw Inserting machines cut costs almost unbelievably. We have one report of up to \$200.00 savings per day on each machine of a battery ... truly a worthwhile investment.

2 BD 49

If you need repetitive production of small parts you need to know about Bodine multi-spindle automatics. Send for a Bodine Bulletin today ... it pictures modern production at its best.

*"You can't meet Tomorrow's
Competition with
Yesterday's Machine Tools"*

THE
Bodine
CORPORATION
BRIDGEPORT 5, CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING,
TAPPING, AND SCREW INSERTING MACHINES

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ELMIRA, N.Y.

PRECISION COLLETS *for* ALL MACHINES

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Hardinge Collets for Millers

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Write for Bulletin No. 48 for complete ordering information, dimensions and prices.



For Automatic Screw Machines

Hardinge Collets, Feed Fingers, Master Collets, Master Feed Fingers, and Pads for Automatic Screw Machines, Brown & Sharpe, Cleveland, Cone, Davenport, Greenlee, Gridley, Acme-Gridley, National-Acme, New Britain.

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Hardinge Collets for Turret Lathes—Acme, Bardons & Oliver, Cincinnati-Acme, Foster, Garvin, Gisholt, Jones & Lamson, Logan, Morey, Oster, Pratt & Whitney, Simmons, Warner & Swasey.

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ONE SOURCE OF SUPPLY — STANDARD SIZES IN STOCK FOR PROMPT DELIVERY

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ARMSTRONG

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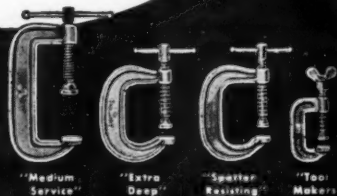
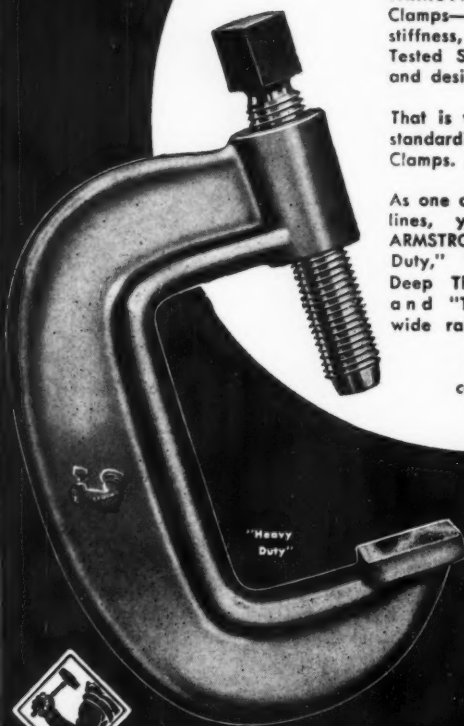
More Reliable . . .

Every characteristic essential to absolute reliability is built into ARMSTRONG Drop Forged "C" Clamps—maximum strength, extreme stiffness, extra large Tempered and Tested Screws, better "Tool Sense" and design.

That is why it is a good policy to standardize on ARMSTRONG "C" Clamps. . .

As one of the 9 major ARMSTRONG lines, your local dealer carries ARMSTRONG "C" Clamps in Heavy Duty," "Medium Service," "Extra Deep Throat," "Spatter Resisting" and "Toolmakers" designs, in a wide range of sizes.

Write for new S-48 catalog, just released.



ARMSTRONG BROS. TOOL CO. "The Tool Holder People" CHICAGO 30, U.S.A.
5208 W. Armstrong Ave.
NEW YORK • SAN FRANCISCO

machine and tool

blue book Contents

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"as COOL as
a cucumber"



with
**Anti-Scoring
LUBRICANT**

Actual tests prove that CMD Anti-Scoring Lubricant will not break and cause scoring or metal-to-metal contact—even under pressures exceeding 50,000 pounds per square inch. Reduce operating costs—eliminate unnecessary waste and danger—give your tools and equipment the best anti-scoring protection available—CMD Center Point lubricants. Write for FREE SAMPLE kit and catalog!



CMD Helical Groove LATHE CENTER

(shown above)

gives top performance—under severest shop conditions. The groove carries oil right to the point. Center lasts longer—work stays cooler.

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Without obligation please send us a free sample kit of one tube of CMD Center Point Lube and one tube of CMD Center Point Oil. Also, send Catalog describing CMD Helical Groove Centers.

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ADDRESS.....

YOU CAN'T BEAT FULMER HONING



Fulmer Model 15-48 honing 12½" x 42" Diesel liner. .012"-.015" of Gun Iron is removed in 10-12 min. Machine capacity: 2"-15" diam.

FULMER COMPANY NOW EXCLUSIVE U. S. DISTRIBUTOR FOR ALEXANDER BALL HONING TOOLS

Available in sizes from ½" to 50" diam.

● WRITE FOR NEW 12 PAGE HONING BULLETIN.

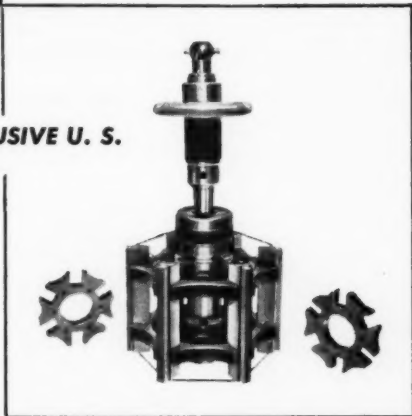
Fully illustrated. Gives valuable data on honing applications, Alexander Ball Honing Tools, and specifications on all models of Fulmer Honing Machines.

● **THE FASTEST**, most efficient and easiest method of finishing cylindrical bores ½" to 30" diam.

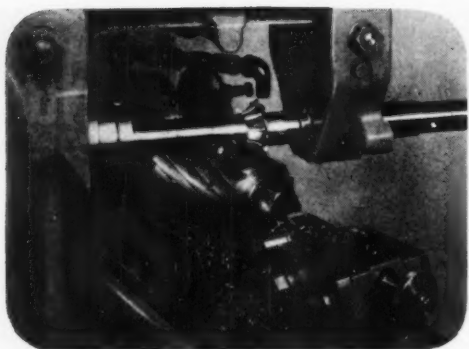
● **FAST STOCK REMOVAL**: It is the common practice for stocks of .015"-.060" to be removed in a fraction of the time required to set up the job for boring.

● **EXTREME ACCURACY**: Hold to ±.0001" tolerance on bore size, straightness, roundness, with any surface finish desired.

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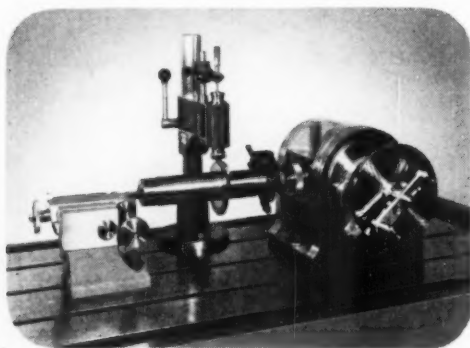


A heavy duty job of milling the flutes in a gang of four shell end mills. CINCINNATI Dividing Heads are ruggedly constructed for work of this type.



CINCINNATI DIVIDING HEAD

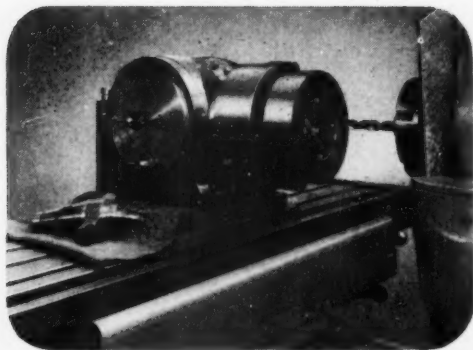
...Milling Machines' Man Friday



Here a CINCINNATI Dividing Head is employed to check the curvature of a cam. Inspectors rely on CINCINNATI Dividing Head accuracy.

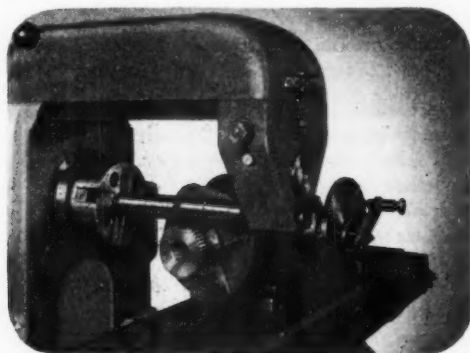
THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.



Drilling the screw holes and milling the drive slots in a face mill cutter body. A CINCINNATI Angle Plate is employed in this setup.

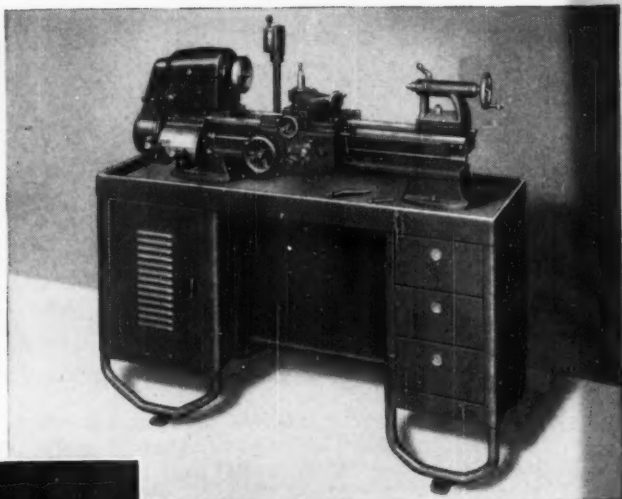
● Robinson Crusoe was not alone in his dependence upon his man Friday. Most of us have someone we depend upon to do a lot of things—correctly. In the realm of machine tools, milling machines have such a man Friday—the dividing head. And when it's a CINCINNATI you can assign a larger variety of work to it; you can count on closer accuracy. ¶ These illustrations show a few of the 1001 ways in which CINCINNATI Dividing Heads can handle the work in your shop. They can be employed in setups on plain, universal and vertical milling machines, and drill presses. And it's a good idea to set one aside for each inspection center. ¶ CINCINNATI Dividing Heads are built in 10", 12" and 14" sizes; all have 40 to 1 ratio. Complete data may be obtained by writing for catalog M-1016-2.



Milling the slots in an adjusting nut. You don't need a variety of fancy milling operations to justify a CINCINNATI Dividing Head, but when you do want super-precise accuracy, you'll get it.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

NEW



Logan **11" LATHES** 1" COLLET CAPACITY 24" AND 36" BETWEEN CENTERS

Specially developed for industry, shops and schools, these 11" Logan Lathes have new, greater capacity plus Logan advanced design and precision construction. Their low price range in the field of lathes with comparable specifications is the first of many economies they offer.

For LARGER WORK . . . the new Logan Lathes have 11" swing, 1" draw-in collet capacity, 1 3/8" spindle hole, and center distances of 24" and 36".

For ACCURACY . . . Ball bearing spindle mounting assures sustained accuracy at any speed from 45 to 1500 rpm without bearing adjustment. Two V-ways and two flat ways of the rugged beds are precision ground to a tolerance of .0005" along lineal capacity of lathe. Total spindle run-out 12" from bearing held to within .0005".

For LOW COST . . . Rugged overall construction keeps maintenance costs at minimum. Self-lubricating bronze bearings protect against wear at 35 points where bearings are not ordinarily used. Quick set-up, speed, versatility and accuracy all contribute to lowered operating cost. No other lathes combine comparable capacity, specifications and advantages at the low Logan price.

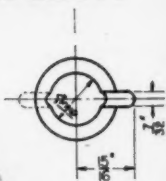
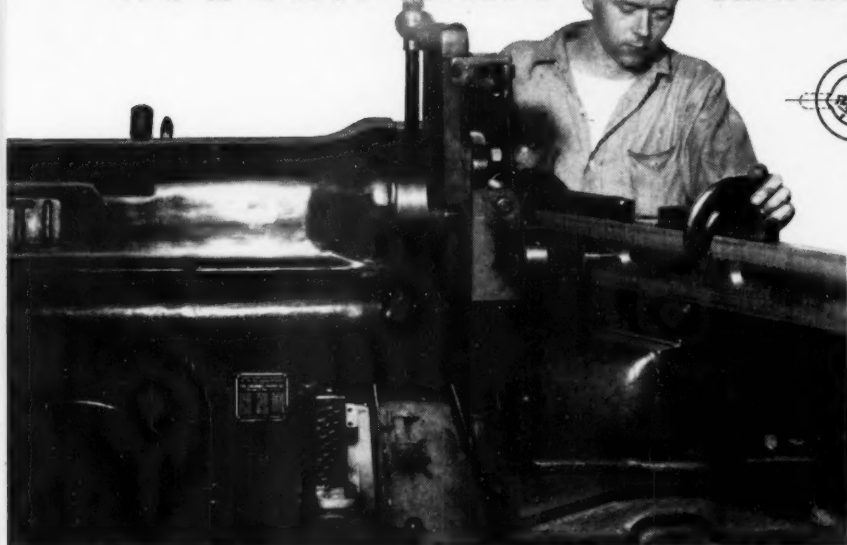
Available in bench, floor, cabinet and turret models.

WRITE FOR DETAILED INFORMATION ON ALL LOGAN 9", 10" AND 11"
LATHES AND 8" SHAPERS

LOGAN ENGINEERING CO.
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IT'S A full-time SHAPER...



PHOTOS—COURTESY THE OHIO KNIFE CO., CINCINNATI, OHIO



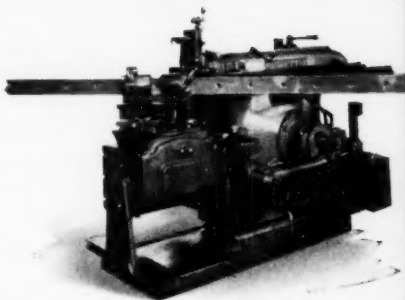
Working two shifts, full time, this Cincinnati Shaper notches fourteen plow-bolt holes in these shear knives every five minutes.



Shapers at The Ohio Knife Company are used strictly as manufacturing tools, for mitering, contour cutting, slotting, corrugating and beveling knife blades.

The setups for all these operations are simple, rapid and inexpensive—and a low manufacturing cost results.

Write for Shaper Catalog N-3. It will help you determine the size and type of Cincinnati Shaper you need.



Knives are high carbon, high chrome steel. Cutting tool is high-speed steel. Shaper operates at 119 strokes per minute.

THE CINCINNATI SHAPER CO.

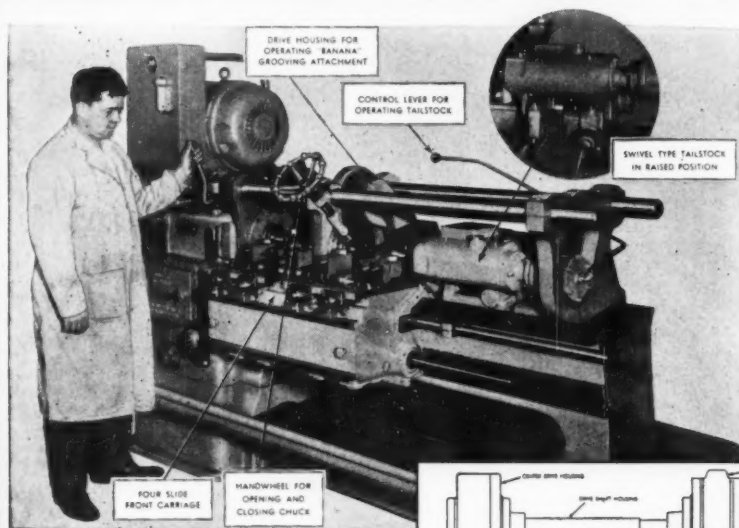
CINCINNATI 25, OHIO U.S.A.

SHAPERS • SHEARS • BRAKES



MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

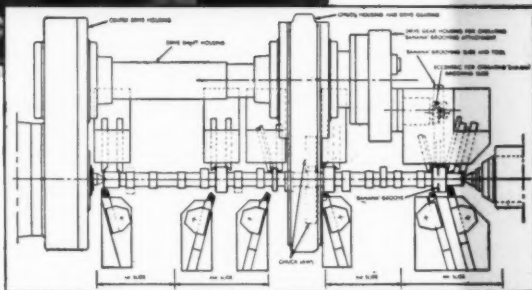


MODEL "LR" CENTER DRIVE AUTOMATIC Lo-swing LATHE TURNS CAM SHAFTS IN SINGLE OPERATION

Problem: Turn and chamfer all bearings, oil pump gears and cut interrupted oil or "banana" grooves in a single operation.

Solution: The Center Drive Model "LR" Automatic Lo-swing Lathe selected for this job was equipped with a special two-jaw scroll chuck, clamping and driving the shaft from the cam located adjacent to the number three bearing. The chuck jaws are opened and closed with a permanently mounted, gear type, hand wheel shaft. The air operated, swivel type tailstock is operated with two air cylinders, one of which swings the hinged upper section vertically, (see insert) to permit easy loading and unloading in a line parallel with the centers, thus eliminating all overhang of the tailstock center. The second air cylinder controls the movement of the spindle quill. Both movements are controlled by a four-way control valve.

The "banana" grooving attachment is driven and TIMED from the main drive shaft and imparts a shuttle motion to the grooving tool slide, which is mounted, with other squaring tools, in a block on



the rear slide. The driving head swivels on the chuck drive housing and follows the "feed in" and "feed out" movement of the rear slide. The "banana" grooves are always cut in definite relation to the chucked cam on the cam shaft.

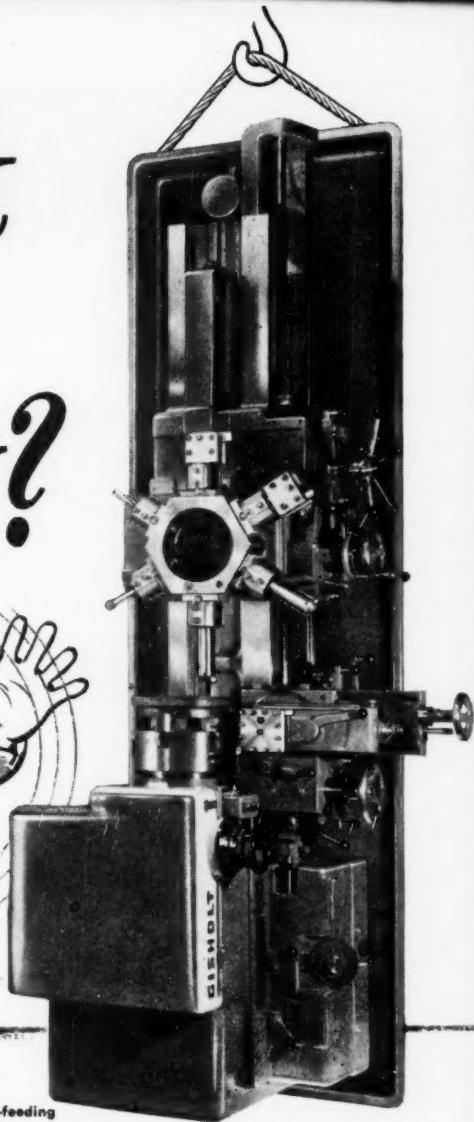
The machine cycle is as follows: the operator places the cam shaft between centers, closes the chuck jaws and operates the spindle starting lever. The front carriage slides and tools advance in rapid traverse to the cutting position and then slow down for normal feed. The squaring, chamfering and grooving tools, mounted on two automatic back squaring attachments, are timed to cut immediately after the front turning tools have ceased cutting. Immediately the rear tools have ceased cutting, all tools and slides are returned to the starting position in rapid traverse. All movements are automatically controlled; the operator simply loads and unloads the parts and operates the starting lever.

Production per hour at 85% efficiency... 80 cam shafts! Bring your turning problems to Seneca Falls.

SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

Ever look at it This Way?



What you see is a Gisholt Saddle Type Turret Lathe with a cross-feeding turret and set on end to look like a Side Head Vertical Boring Mill.

This Turret Lathe is ideal for varied work on small lots. The cross-feeding hexagon turret will bore, face, recess, thread or otherwise finish the interior of the workpiece. The square turret on the side carriage will meanwhile face, turn or chamfer the OD. When necessary, you can pilot the hexagon turret tools or make other use of the hollow spindle. And all this is done with simple, inexpensive, easily set up tools.

Investigate the five basic sizes of the Gisholt Saddle Type Turret Lathe. Each is available with the money-saving cross-feeding turret.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin



THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

SAVE

on FIXTURE DESIGNING WITH BETTER WORK HOLDING

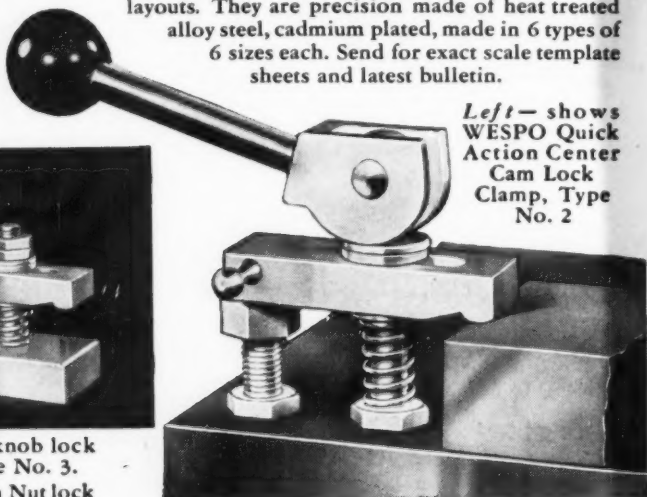
WESPO

Improved

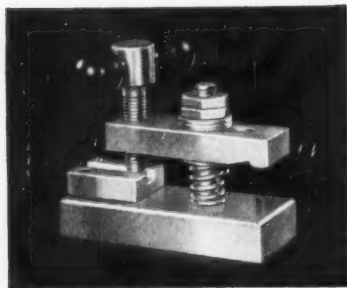
FIXTURE CLAMPS

WESPO also makes a complete line of over 350 types and sizes of fixture parts and fittings.

WESPO Clamps can be included in your fixture layouts. They are precision made of heat treated alloy steel, cadmium plated, made in 6 types of 6 sizes each. Send for exact scale template sheets and latest bulletin.

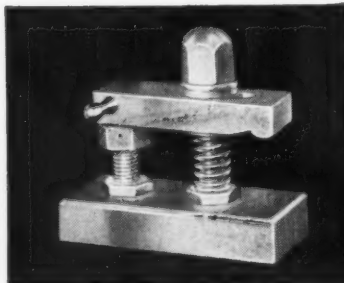


*Left— shows
WESPO Quick
Action Center
Cam Lock
Clamp, Type
No. 2*



*Above— End knob lock
clamp. Type No. 3.*

*Below— Acorn Nut lock
Type No. 5*



Representatives in industrial areas. Complete stocks at factory and the following:

ROCHESTER, N. Y.	Rekers & Roessell
WICHITA, Kan.	Cummings & Co.
MILWAUKEE, Wis.	Triplex Supply Co.
CANTON, Ohio	Service Tool & Supply
CAMDEN, N. J.	Fidelity Tool Supply
CHICAGO, Ill.	J. R. Reinertson & Co.

WEST POINT MFG. CO.

19631 Merriman Court
FARMINGTON, MICH.

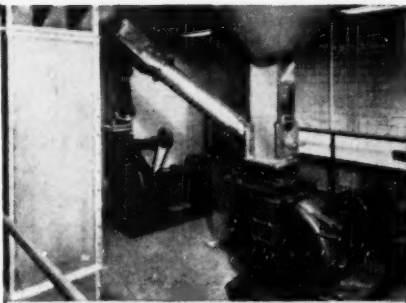
Second in a series of
Unusual Grinding
Wheel Operations



Even ASPIRIN has a headache!

● One of the toughest problems of aspirin manufacturers is to produce tablets that will disintegrate and "go to work" quickly. This is partly solved by grinding the dried mixture into the exact consistency before pressing the tablet.

Whatever YOUR grinding problem may be, BAY STATE can solve it . . . fast. Possibly the exact specifications to meet your requirements can be supplied directly from large stocks either in Westboro, branch warehouses, or from our distributors strategically located throughout the United States. Send us your grinding problems. We can help you.



Photograph of Aspirin Grinder, Courtesy of The Bayer Company (Sterling Drug Inc. Successor)

BAY STATE ABRASIVE PRODUCTS CO.

Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses - Chicago, Cleveland, Detroit.
Distributors - All Principal Cities.



Top Performance Consistently Duplicated

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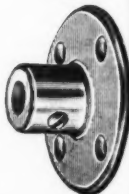
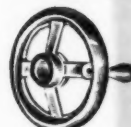
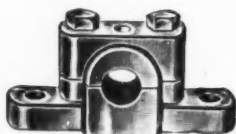
Yes!—they're all

Chicago DIE CASTING Stock Items

The castings displayed on this page are just a part of our Stock Line. You save time and money when you use Chicago Castings.

**Make our factory
your headquarters
for your casting
requirements.**

**For complete
information
write for
CATALOG No. 49A**



Chicago DIE CASTING MFG. COMPANY
2512 West Monroe Street, Chicago 12, Illinois



GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting
edges give a shearing cut
that eliminates all chatter.
Made of high speed steel
ground after hardening.

12 sizes: $\frac{1}{4}$, $\frac{3}{16}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$,
 $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$,
and 2 inch.

Standard 30°, 41°, 45° with
center line. Also made in any
other angles to order.



SEND FOR
CATALOG
SHEET
No. CC1



Grobet
SINCE 1812

SET OF ELEVEN
COUNTERSINKS
IN STRONG
WOODEN CASE
 $\frac{1}{4}$ " to $1\frac{1}{2}$ "

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PLANTS: NEW YORK · CHICAGO



WRITE on your
letterhead for
personal copy,
FULFLO
MECHANICAL
DATA BOOK



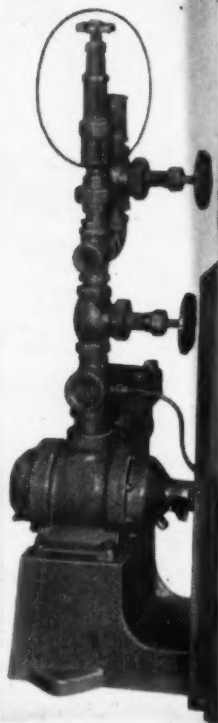
**BY-PASS
OIL-RELIEF**

VALVES

THE photograph of installation in oil spray systems built by the Brown-Fayro Co., Johnstown, Pa., is a striking illustration of the versatility of FULFLO valves.

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5 springs for predetermined pressures
from 50 to 350 lbs.

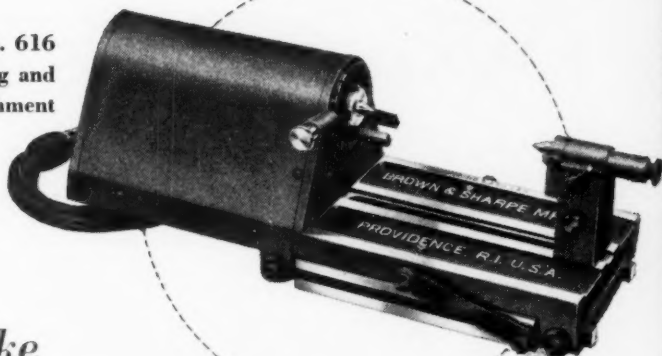


THE



Specialties Co., Inc.
BLANCHESTER, OHIO

**The Versatile No. 616
Cylindrical Grinding and
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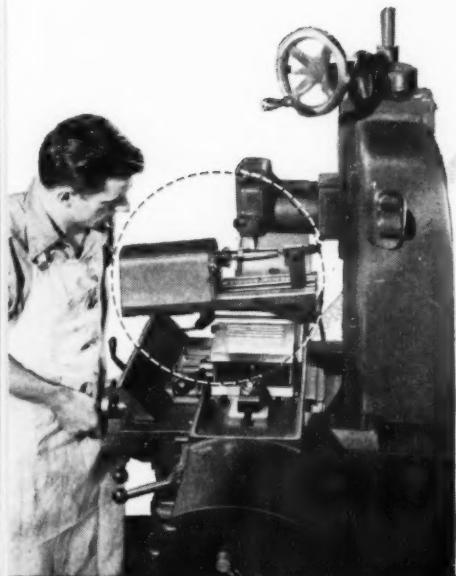
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Here's an efficient, economical way to employ your surface grinders for dry grinding small cylindrical work, tapers and work requiring indexing... equip them with Brown & Sharpe No. 616 Attachment. With this portable attachment, straight cylindrical or tapered work is ground between centers or, if $\frac{1}{2}$ " diameter or less, work can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

Look to the No. 616 Attachment for increased returns on your surface grinders. It's inexpensive, compact, precision-built. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

No. 616 Attachment in use on Brown & Sharpe No. 2L Surface Grinding Machine. Capacity of Attachment: centers swing 6" diameter; take work $5\frac{1}{4}$ " in length. Maximum grinding angle, 45° .

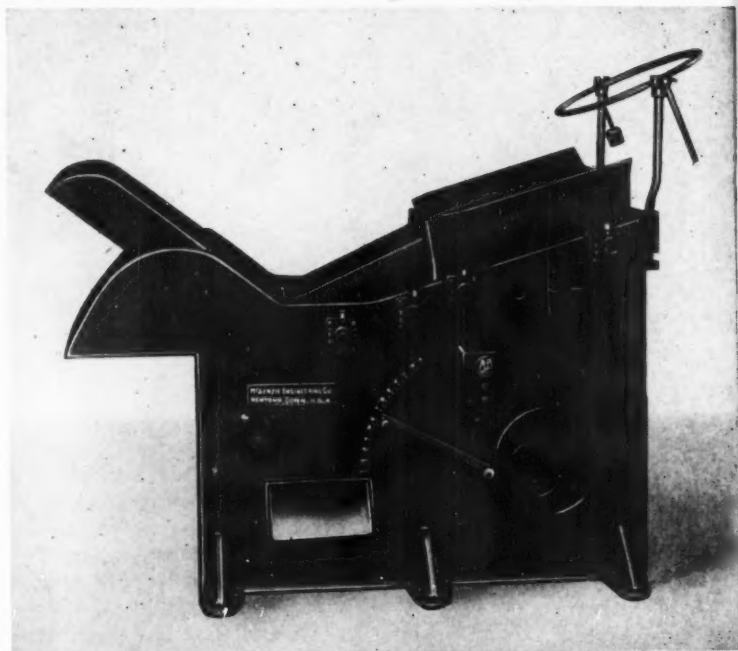
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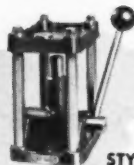
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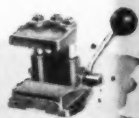
WOODWORTH *Cone Lok* JIGS



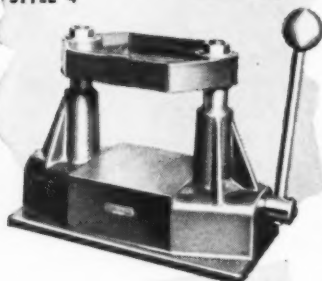
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STYLE 3



MINNIE JIG



STYLE 4

MINNIE JIG—for small work in 2 sizes: 1" x 1" and 1" x 2" working area.

STYLE 3—up-clamp type for controlled depth of machining; sizes from 4" x 6" to 9" x 12".

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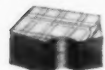
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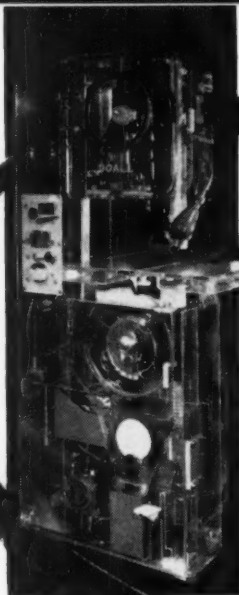
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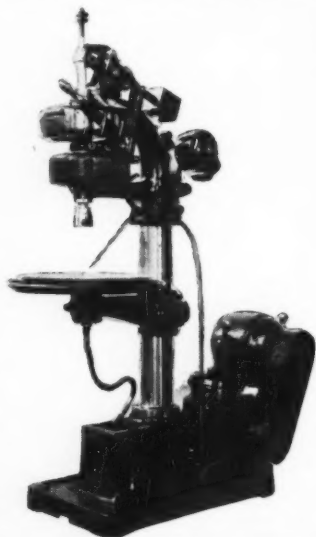
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Western

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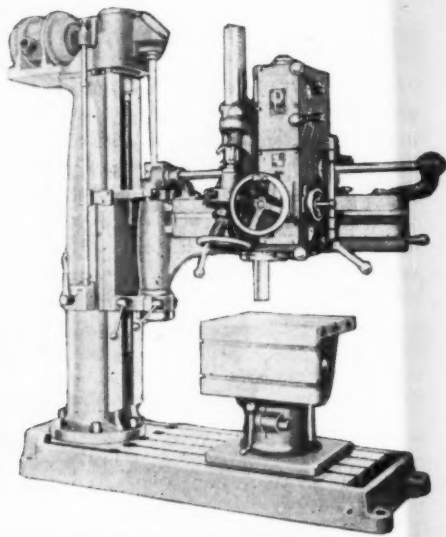
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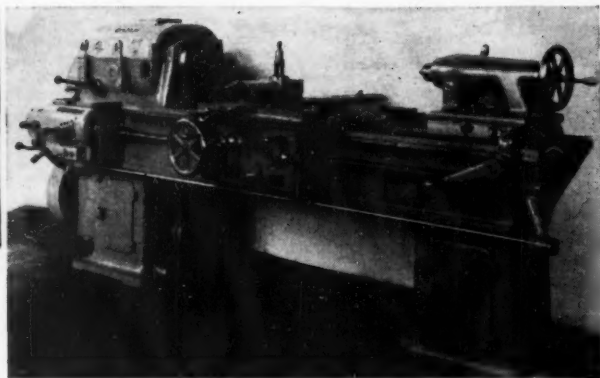
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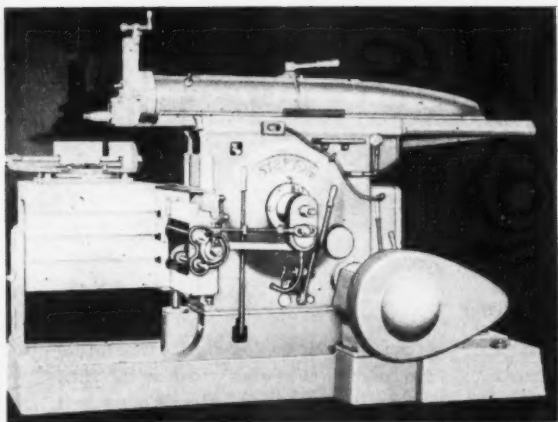


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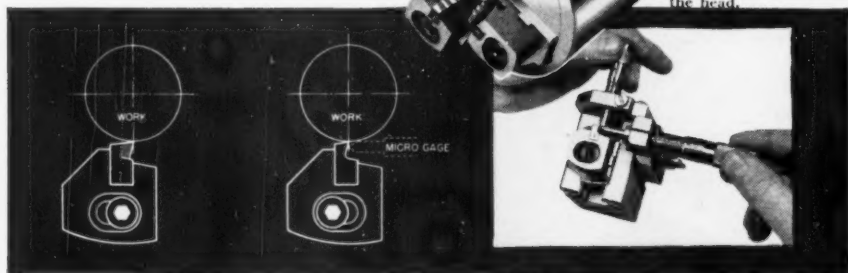
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DIVISION 14, DAYTON 1, OHIO

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has this two-way adjustment—
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The new Adjustable Blade Chasers, applied to standard Vers-O-Tool heads, are positioned to the specified cutting size by positive, quick diametric adjustment of the head.



New chaser, with block offset to left—cutting edge up to proper working position. At least six regrinds available.

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The double-barrel micrometer gauge, made famous for checking Namco Circular Chasers, is equally applicable for use with the new Adjustable Blade Chasers. It provides accurate determination of the exact amount of metal to be removed in grinding—and a positive check of the reground blades.

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Adjustable Blade Chasers will provide at least six regrinds—twice as many as conventional blade chasers.

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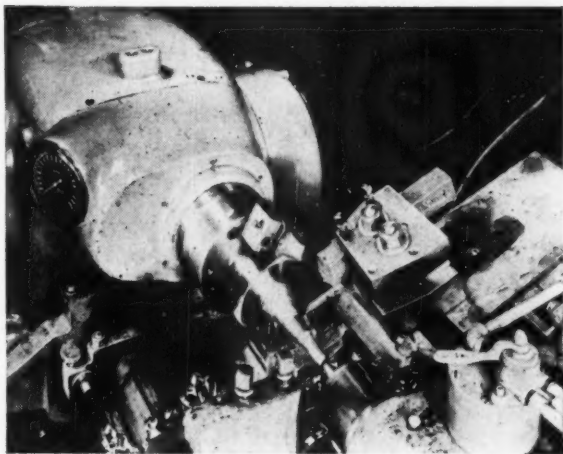
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JOB FACTS

Part—Steering Knuckle
Material—SAE 3135 forging
Operations Performed—Turn stem complete; face flange
Cutting Tool—Carbide Insert
Tolerance— $\pm .001$ "
Total Machining Time—1.23 minutes.

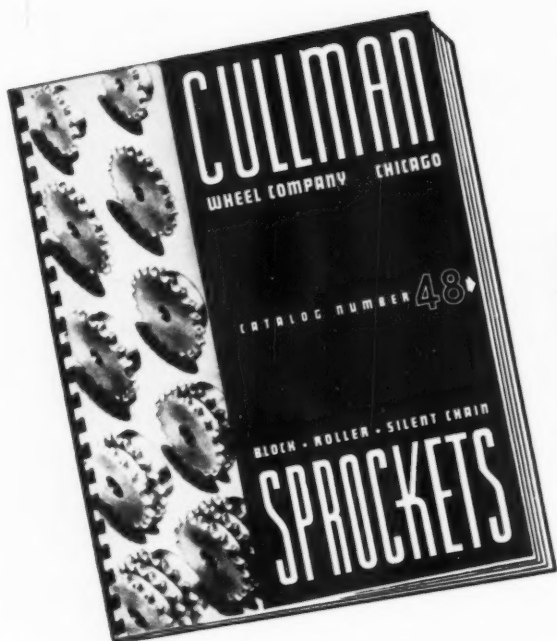
Note—Two pieces are produced in the above time, as one man operates two machines.



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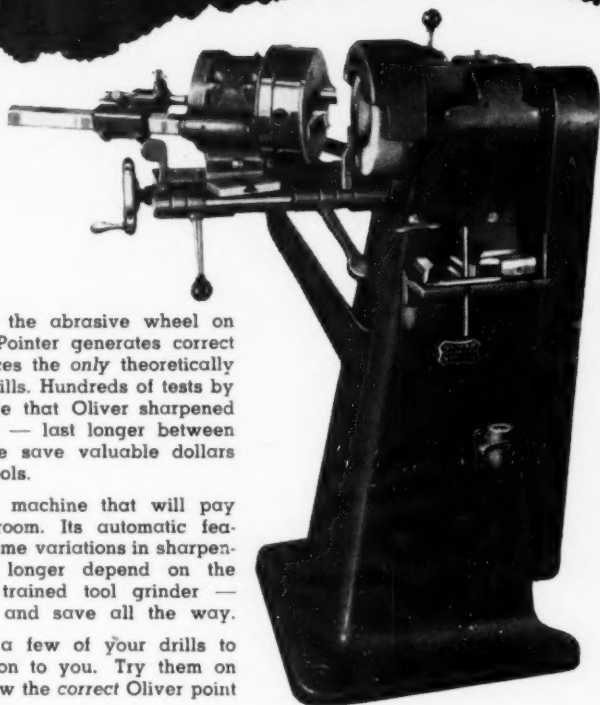
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makes perfect drill points on the

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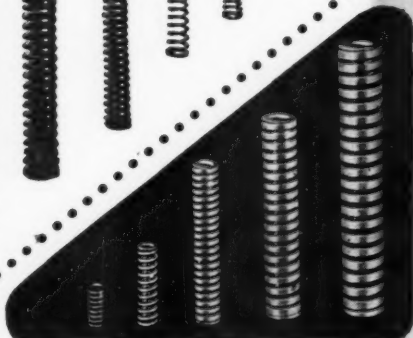
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Medium Pressure—
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2

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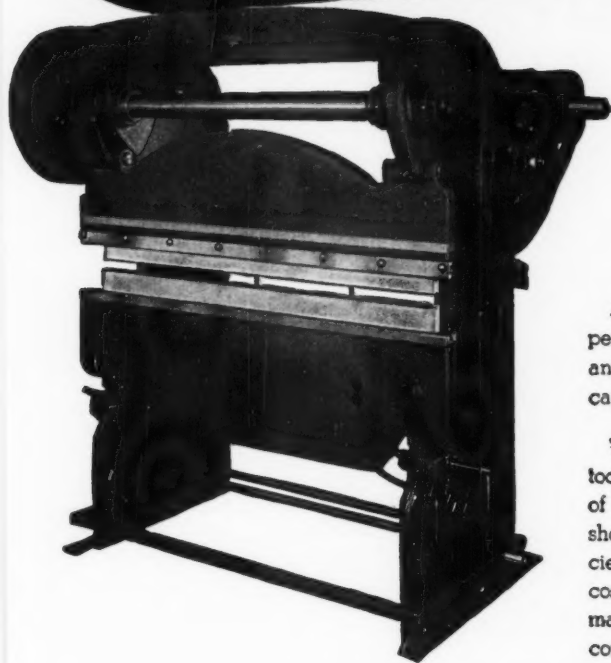
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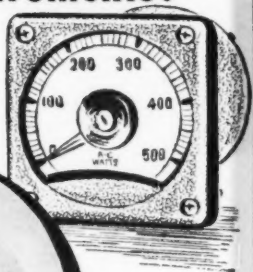
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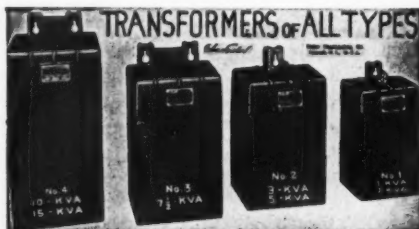
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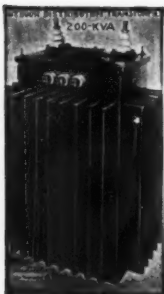
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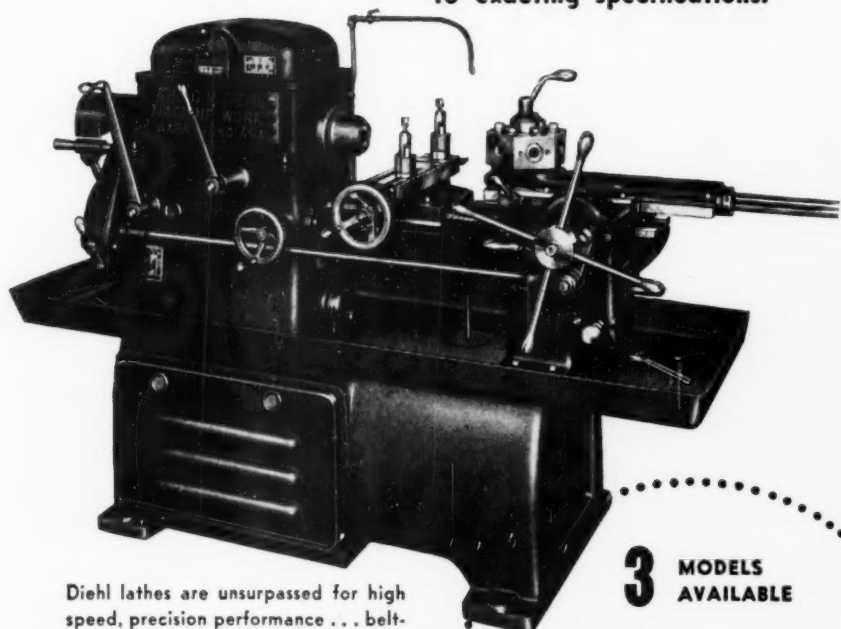


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Swing-over bed.....14"
Six speedsforward and reverse

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The G. M. Diehl Machine Works, Inc.

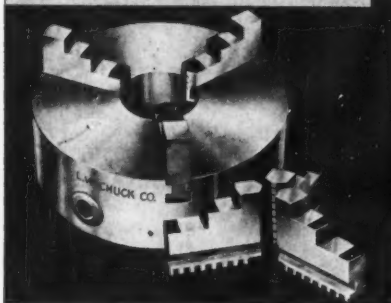
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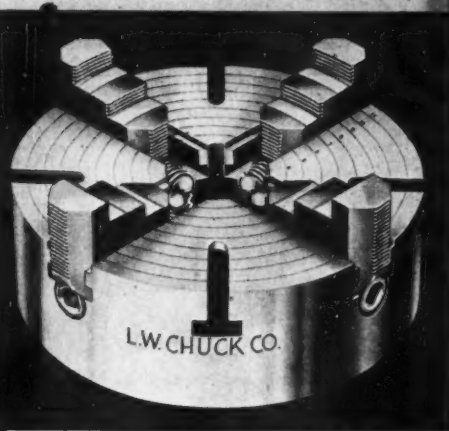
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FOR HEAVY DUTY WORK

6 1/4" \$45.00 7 1/2" \$55.00 10 1/2" \$92.60



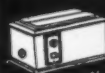
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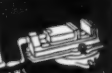
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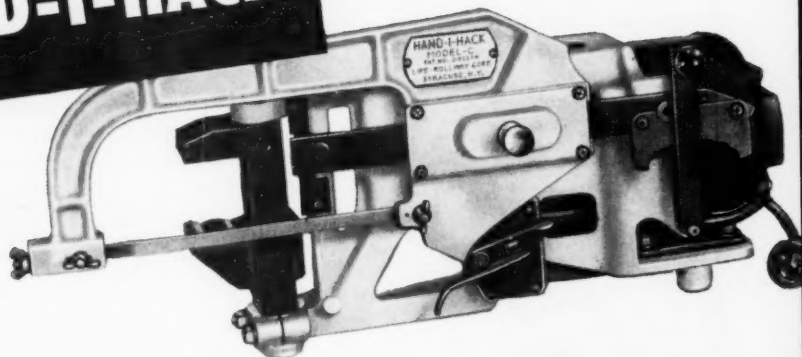
POWER RACK SAWS

L-W CHUCK COMPANY

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NOW! The Only PORTABLE Power Hack Saw!

HAND-I-HACK*



**Eliminates Fatigue!
Easily Carried!
Works in Any Position!**

Capacity 3" x 3". Saws in horizontal, vertical and upside down position. Cuts square and true any metal from tough solid steel to thin wall tubing. Simply put your work in the HAND-I-HACK swivel vise... clamp tight... set blade... start motor. HAND-I-HACK does the rest. Shuts off automatically when cut is finished.

**Blades last from
3 to 5 times longer!**

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Uses standard 10" high speed hand blade
... 120 strokes a minute. Accurate angles up to 45°.



* Trade Mark Reg. U. S. Pat. Off.

**One Hand
Carries It!**

(Light Weight Aluminum Alloy)



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YOUR FIRST and WISEST CHOICE

Eliminate fumbling and guessing
when gaging Holes, Slots, Finding
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Horberg Drill Size Pin Gages are
accurate to $+.0001-.0000$.



FOR



DEPENDABLE GAGING

$1\frac{1}{2}$ " long. For easy insertion, precision
alignment, lower half is concentric tapered
to fit holes 0.0012 smaller than gage size.
Oil hardened tool steel. No other pin gage
has such accuracy at so low a cost.

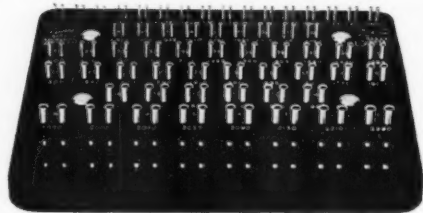
INDIVIDUAL STOCK SIZES \$1.00 each

LETTER SETS: 52 gages
from A to Z — \$45

FRACTION SETS: 60
gages $\frac{1}{4}$ " to $\frac{1}{2}$ " in steps of
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NUMBER SETS: 120
gages 1 to 60 — \$90

STAND ALONE — \$10



Sets come in pairs for gaging any number of similar holes. All sets
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size is plainly stamped in front of each hole, together with decimal
equivalent to the ten-thousandth of an inch.

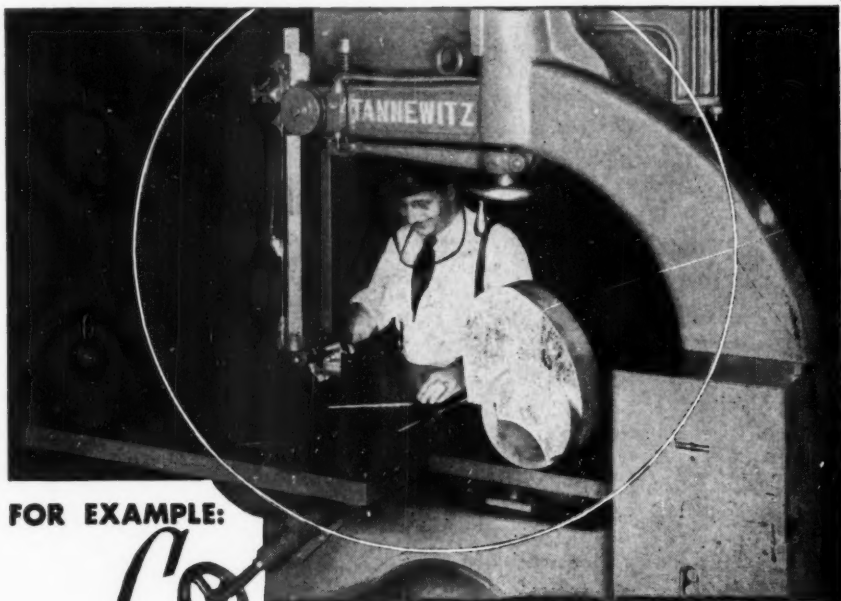
Prices F.O.B. Bridgeport, Conn. Immediate Delivery.

THE *Horberg* GAGE COMPANY

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FRICTION SAWING

solves thousands of Problems!



FOR EXAMPLE:

CUTTING side panels of a barometric damper as shown above. Cost of dies required for seven sizes would have approximated \$12,000 — a prohibitive sum for volume required on these sizes. Friction-sawn on a TANNEWITZ High Speed Band Saw in multiples of two in 1.2 minutes each — a very moderate cost which makes feasible the complete line required. Cost of machine was only a small fraction of cost of dies contemplated and it is also available for many other uses.

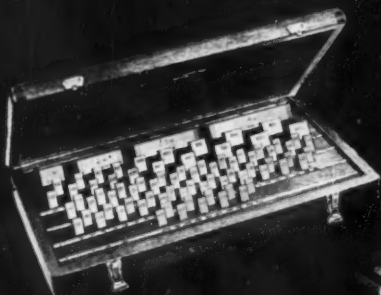
For trimming castings, formed parts, cutting metal as hard as a file and dozens of other operations, too, friction sawing with TANNEWITZ High Speed Band Saws offers tremendous advantage. Write for free booklet, "FRICTION SAWING."

THE TANNEWITZ WORKS GRAND RAPIDS 4,
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... in the full range of sizes



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RECTANGULAR



SET No. 82-C
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OUTLASTS ORDINARY STEEL GAGE BLOCKS

by 139 to 1

- ◆ Surface finish 0.15 to 0.3 micro inch rms. Almost absolute perfection.
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STAMFORD • CONNECTICUT

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also... **FONDA** "ultra-finish"
STEEL GAGE BLOCKS

... complete sets and individual sizes ... standard inch and metric measurements ... maximum accuracy, longer wear, finer finish and superior wringing qualities. **FONDA** Steel Gage Blocks superior to all others.

Economize!

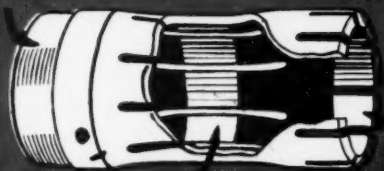


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bar ends!*



Hardened and
ground threads

Patent No.
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Full size

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A positive, concentric grip—TO THE END OF THE BAR

Triple economy here, (1) more good pieces per bar (2) heavy-duty construction for long life (3) fewer adjustments require less down-time. Dual bearings do it—50% to 100% more surface means better grip, less pressure and fatigue.

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• Master Collets

• Master pushers

• Collet tubes

• Pusher tubes and spools

• Finger holders

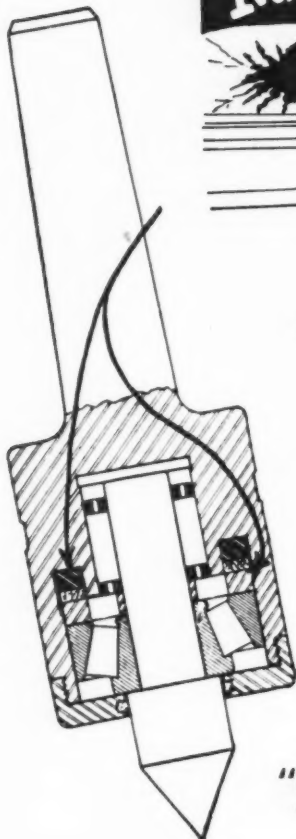


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Precision LIVE CENTERS

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Arrows point to 3-layer pads that compensate for expansion caused by heat in cutting and machining — absorb shocks that otherwise break tools or spoil the work.

THESE BUILT-IN
"SHOCK ABSORBERS"
 REDUCE TOOL BREAKAGE

**Utility
Tools**

*Insist on Glenzer—
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THE J. C. **GLENZER** CO., Inc.

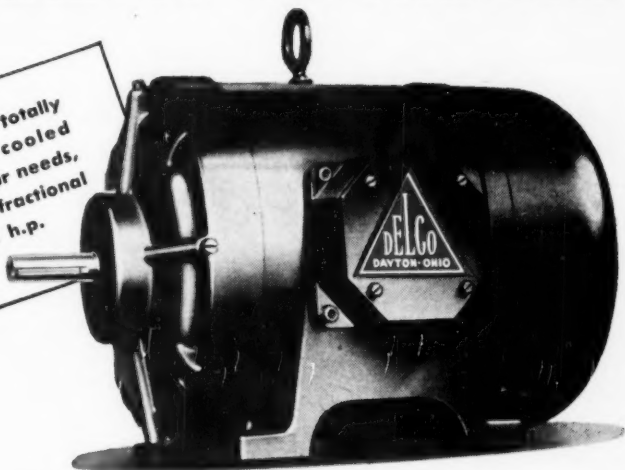
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STAND UP TO THE JOB

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RUSNOK heavy duty Mill Head quickly and easily converts your horizontal mill to do vertical or angular milling, drilling and boring operations. **RUSNOK** Milling Attachment takes the place of costly, special equipment — uses no valuable space, just install on your present mill.

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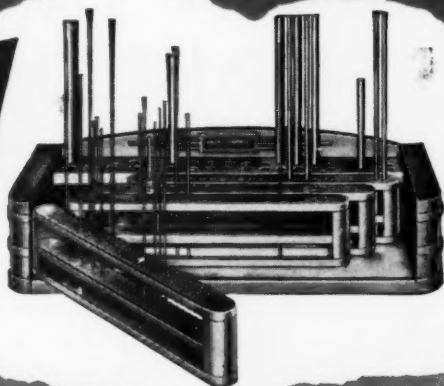
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Holds 495 three-foot lengths in 133 number, letter, and fractional sizes including 1". Takes up shelf area only 27" wide x 12 1/2" deep.

- Each rod fits its individually sized hole.
- Holes plainly marked in sizes with their decimal equivalents.
- Instant rod selection.
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Notice there is no struggle to separate the die set. Indexed Screw Wrenches* lift holder axially from die shoe. Operator raises or lowers die smoothly, safely, accurately . . . or holds it at any desired height.

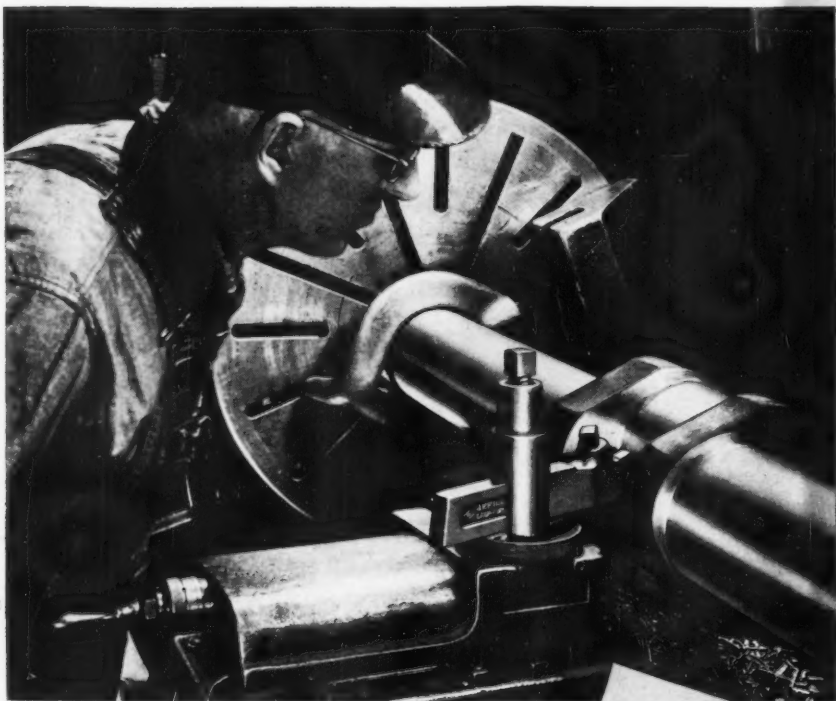
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*Patented . . . Exclusively Acro

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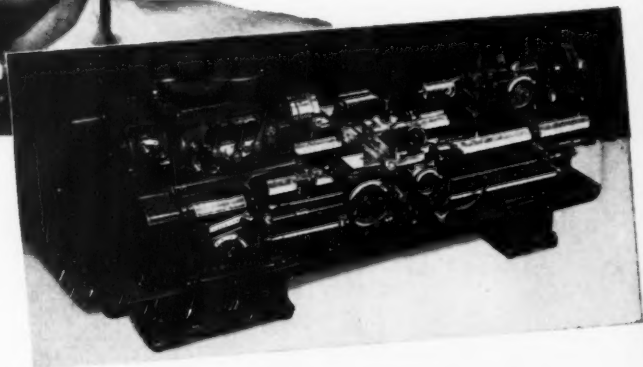
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MASTER MACHINISTS AGREE...there is no finer engine lathe than an AXELSON. Designed by men who are themselves master tool makers, AXELSON lathes embody the features that contribute to faster production, more accurate work, easier and safer operation, and maximum versatility.



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THE "FEEL" OF PERFECTION...is immediately apparent the first time a machinist puts the tool to the work in an AXELSON lathe. Velver-smooth control action...more positive flow of power at the cutting tool without vibration or chatter.

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BUILT-IN SAFETY...protects operator from injuries, tools from breakage, and work from reject bin. All controls within easy sight and reach of operator.



AXELSON *Lathes*

DEPENDABLE FOR A THIRD OF A CENTURY

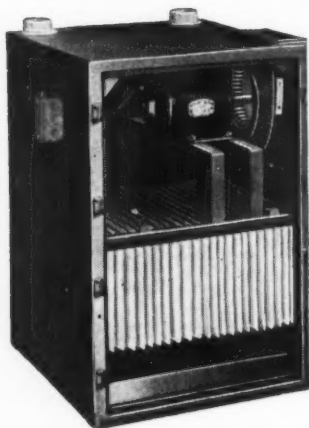
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Keep your eye on production figures
by eliminating abrasive dusts with

TORIT DUST COLLECTORS



TORIT Dust Collectors range in size from $\frac{1}{4}$ HP to 3 HP. Completely self-contained they are designed to filter and recirculate dust laden air from single, or compact groups of cut-off, polishing and grinding machines. They require no extensive piping, and their compact design permits fitting into crowded production layouts.

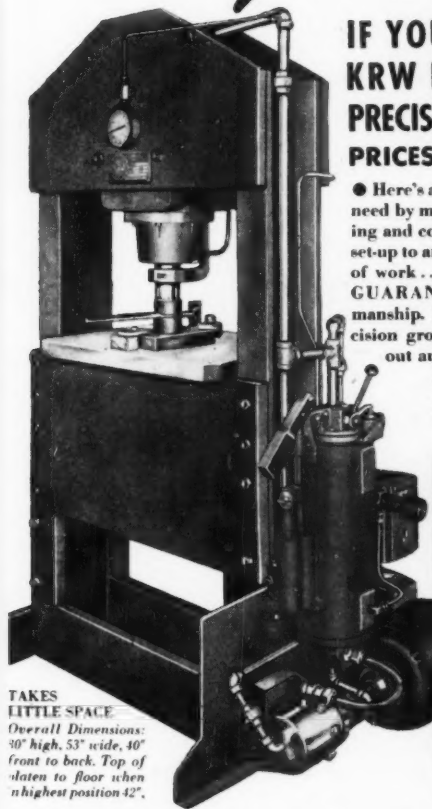
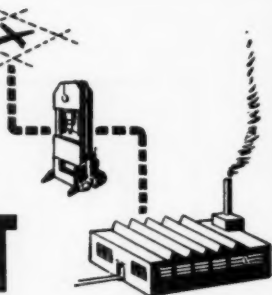
TORIT Dust Collectors are economical. Compactness reduces power requirements and they turn on and off with the machines. They are easy to clean and ruggedly built for long life. For details and the latest TORIT catalog write:

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There's a PLACE... for this PRESS in Your PLANT



**TAKES
LITTLE SPACE**
Overall Dimensions:
30" high, 53" wide, 40"
front to back. Top of
platen to floor when
in highest position 42".

* Depending upon capacity and size of hydraulic
equipment and motor required. F. O. B. Factory.

**IF YOU WORK WITH METAL, THIS NEW
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● Here's a brand new dual purpose Hydraulic Press that fills a long felt need by many plants. This new 75-ton press can be used on many forming and cold forging or pressing operations. It is easily shifted from one set-up to another; can be used with inexpensive dies to do a wide variety of work... relieving heavier equipment for other work. The press is **GUARANTEED** for ONE YEAR against defects in material or workmanship. Here are some of its features: adjustable bed, platen is precision ground. Equipped with 2-speed built-in hand pump for die try out and delicate pressing. Mechanite Cylinders precision machined and honed to mirror finish. Guided ram to prevent ram swiveling. Get the facts about this latest KRW press development. There's a place in your plant where it can save you money.

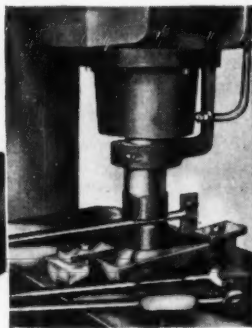


Illustration shows the press being used
to cold form an automotive valve lifter.

BRIEF "SPECS"

Standard Model, Series 3700-F,
75-ton.

6" ID Cylinder, 7 1/4" stroke.

Platen 30"x 18"x 2", adjustable
in 4" steps.

Daylight 6" Min. to 18" Max.

Frame Heavy welded steel.

11" stroke cylinder available
in air return or double act-
ing types.

Ram Travel Speed varies from
1" per 3.5 seconds to 1" per
2.6 seconds depending upon
capacity of hydraulic equip-
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Delivery: Standard models
one week.

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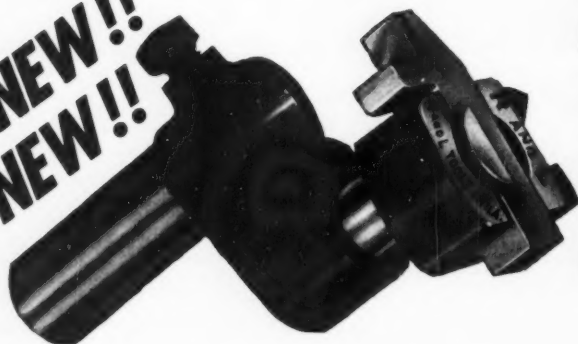
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TURRET
BACK REST
HOLDER**

For use on R and L Turning Tools. Simple design allows for convenient interchanging of the R and L carbide surfaced or Roller Backrest (above) and the R and L Burnishing Backrest shown below. Built in sizes to fit all R and L Turning Tools.



R and L Tools Changed in Ten Seconds for Right or Left Hand Turning.

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Also Turning Tools . . . Roller Backrests . . . Carbide Backrests . . . Tap and Die Holders . . . Universal Tool Posts.

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**TURNING
TOOL...
Replaces
14 TOOLS**

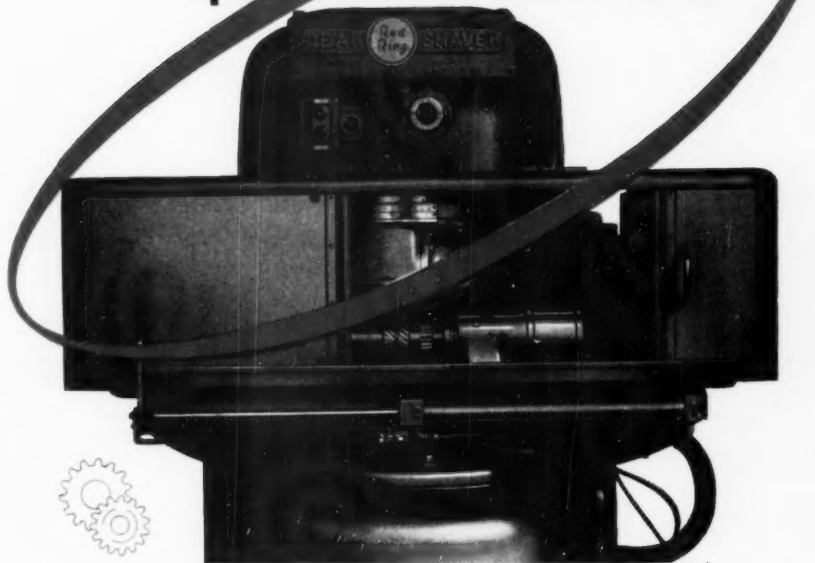
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. . . in 10 Seconds

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SEMI-AUTOMATIC operation speeds GEAR SHAVING



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These are the air operated tailstock and the air operated, electrically controlled automatic splash doors. The former clamps the work gear quickly and accurately in shaving position. After loading, the operator presses a

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5267

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GEAR SPECIALISTS
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World's Largest Producer of Gear Shaving Equipment

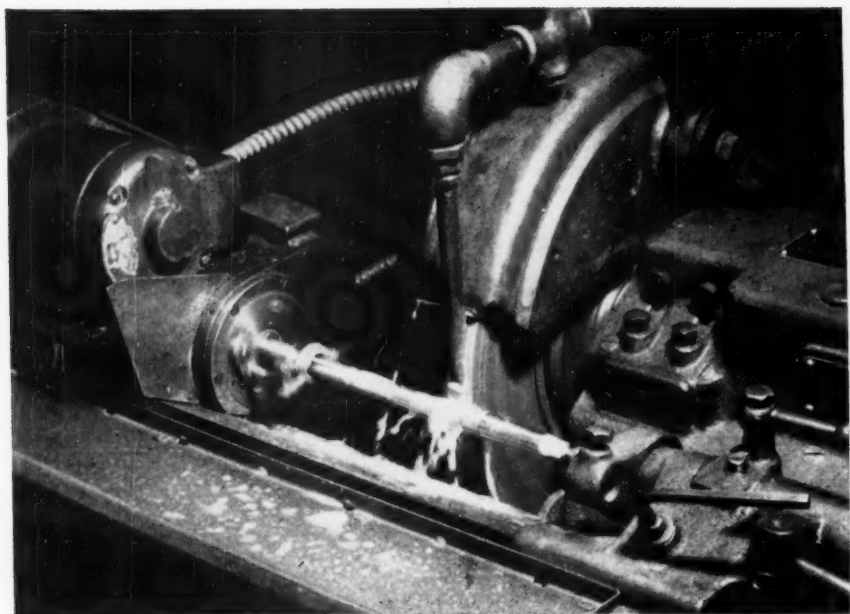
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CYLINDRICAL GRINDING IN THE TOOL ROOM

LOW PRODUCTION COSTS, as well as low tool costs, require that tools and cutters be kept sharp. Dull tools spoil work, slow up production, take too much power and often have to be discarded before their normal life is half over. Because very little stock has to be removed when tools are only slightly dull, frequent sharpening lengthens the life of the tool. Because total sharpening time is much less, it costs less to sharpen tools frequently.

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Plug gages, punches, reamers and many other tools can be successfully ground on the cylindrical grinder with the use of



a Robertson RA605-KV wheel. Increases in production between grinds have run from 70 percent to as high as 400 percent. Several manufacturers report that it is the best all-round wheel they have ever used.

For faster and more accurate tool-grinding—for any grinding job, big or small, and especially the tough ones—specify Robertson. Whether they're vitrified or resin-bonded, Robertson Grinding Wheels enable you to buy production time.

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Increase the value of *your* product—reduce the man-hours lost in searching catalogs, matching similar parts. Reduce the confusion in sorting and storing. Make it easy for your customers to re-order from the positive identification on the part itself. *At today's high production costs an unmarked part is an expensive luxury.* The man hours saved in a few months will buy the finest marking equipment available.

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LOWER YOUR COSTS
And At The Same Time
PRODUCE BETTER FINISHES

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PRECISION SPINDLES
WITH
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POPE MACHINERY CORPORATION
ESTABLISHED 1902
For Twenty-Five Years Builders
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No. 59

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RUGGED CONSTRUCTION

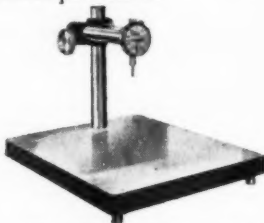
INGENUITY PLUS--

... the combination of Ames Dial Comparators shown below will allow you to handle practically all of your measuring and control problems.



No. 1 Dial Comparator.

This model has a table which is adjustable for height. Lever at left of dial is pushed down to lift indicator rack spindle. Any Ames Indicator can be attached, but the one regularly supplied is Model 202 with dial numbered 0-100, reading .001", having .250" range.



No. 130 Dial Comparator.

Especially designed for checking comparatively heavy parts. Size of base and length of upright post to suit customer's requirements.

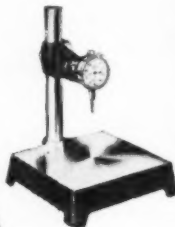


No. 26P Dial Comparator.

For indicating the most minute variations in size of duplicate parts. Supersensitive Fan Head Dial Indicator graduated in .00005". Total range .002". Adjustable tolerance hands and diamond contact.



No. 2 Dial Comparator. Compact. Regular or dead weight contact pressure. Table dia., 2". Adjustable for "0" setting. Height 5 $\frac{3}{8}$ "; weight 2 $\frac{3}{4}$ lbs.



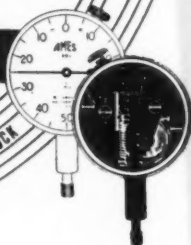
No. 13 Dial Comparator. The 8" x 8" cast iron base can be fitted with locating fixtures and V-blocks. The bracket supports any Ames Indicator, but regular equipment is Model 202 with dial numbered 0-100, reading .001", having .250" range.

Address inquiries to Home Office, 28 Ames Street

B. C. AMES CO. Waltham 54, Mass.

MANUFACTURER OF MICROMETER DIAL GAUGES
AND MICROMETER DIAL INDICATORS

Representatives in
principal cities



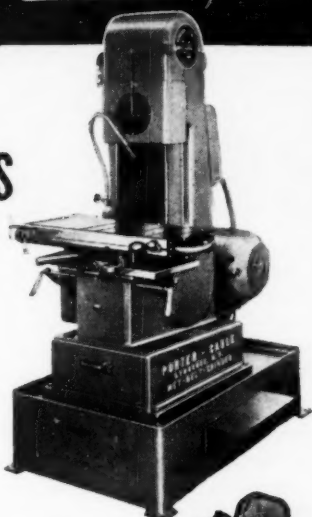
Do Your Machining *5 to 25 Times Faster!*

Porter-Cable WET-DRY ABRASIVE Belt SURFACERS

Wet-Belt BG-8 Surfer

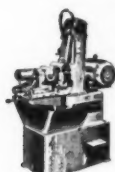
Rugged machine for production line work.

Here's a modern machining method that speeds up surfacing from 5 to 25 times. Has automatic feed table. Holds close limits. Surfaces large areas in one presentation to the belt. Eliminates heat, distortion, discoloring, fracturing, chipping. Produces a final finish while making the cut. And an operator can do many jobs freehand or with simple, inexpensive jigs.



L-4 Centerless Grinder

Meets the various needs of the smaller shops. Saves 75% to 90% of set-up time on wide range of work.



C-6 Contour Grinder

Does clean contour grinding and polishing. Eliminates costly set-up time and less efficient set-up wheels.



B-6W Wet or Dry Belt Surfer

Grinds, sands, polishes on flat or irregular surfaces. Flexible belt follows contours and reaches inaccessible spots.



WG-4 Wet or Dry Surfer

Does line contact and platen grinding. Removes stock faster. Machines small parts flat, square, tapered, etc. Removes flashings, fins, etc. Follows up bigger machines, like shapers.



ABS—Backstand Idler, floor type

Converts your grinding jacks into high production belt grinders and polishers. CBS type is for wall mounting.



BBS—Bench Belt Grinder

Fits grinding need in almost any shop or department. Does clean-up, deburring. Removes flashings, risers, tool marks, etc.



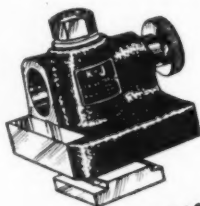
PORTER-CABLE Machine Co., 2124 No. Salina St., Syracuse, N. Y.
Manufacturers of **SPEEDMATIC & GUILD Electric Tools**

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with **K-J** **Quick Change
LATHE TOOLING**

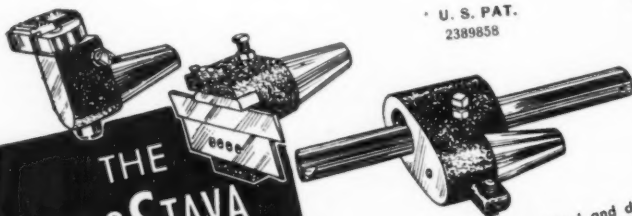
The time saving and simplifying of operations is unbelievable until actually experienced. Change from drilling to boring, to threading, turning, facing, cutoff and all other operations takes but three or four seconds and affords a permanent, ready made set-up for all standard engine lathe operations. No wrenches needed for operation changes. Rigid and vibration free, they insure closer accuracy and greatly prolong tool life. Designed to use cemented carbide tipped tool bits.

Send for detailed information. Try K-J Quick Change Lathe Tooling on any engine lathe and you will find that it really costs money to be without it, regardless of number of pieces per job.



TOOL HOLDER BASE
Holds tools for all operations, enabling instant, precision changes without wrenches.

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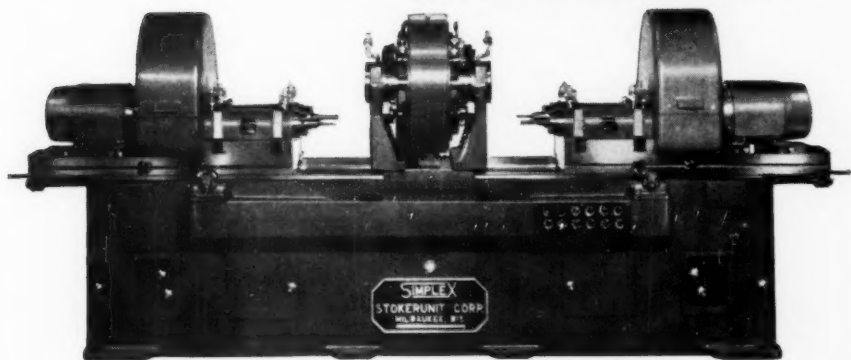
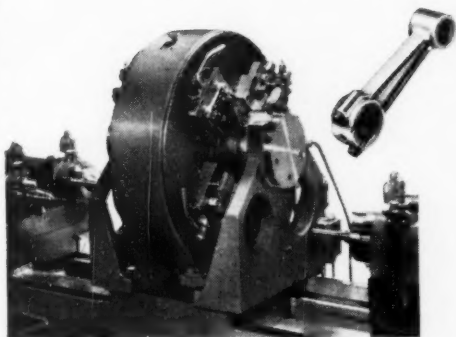
Boring tools are rigidly supported and designed to eliminate excess overhang. Instantly changed from any other engine lathe operation.

Quick change tools available for straight turning, cutoff, side-forming, end-forming, threading or turning, drilling, boring, thread chasing, knurling, box turning, cutting of practically any type.



SIMPLEX

Small high speed gas engines run at speeds unbelievable a few years ago yet with mechanical failures rare due to the increasingly high standard of workmanship on the running parts, but costs must be reduced to reach the volume market. SIMPLEX Precision Boring Machines with SIMPLEX engineered tooling are used for this purpose by many leading manufacturers.



This SIMPLEX 2U 2-way Precision Boring Machine with double-faced automatic indexing trunnion fixture is tooled for semi-finish and finish boring small die cast aluminum connecting rods with bronze inserts. Boring tolerances are plus .0003, minus .0000. Interchangeable fixtures are provided so that several different size rods can be run on one machine. This principle is applicable to many size rods where maximum production and accuracy at low unit cost are required.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4530 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

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Precision ROD CUTTING at High Speed



with the New
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The DI-ACRO Rod Parter further increases the range of "DIE-LESS DUPLICATING" as a real cost-cutting, time-saving production technique so well established by the DI-ACRO Benders, Brakes and Shears.

Do you require precision?—The DI-ACRO Rod Parter holds tolerance to .001" on duplicated cuts. The ends are square, and roundness is maintained.

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Shows parts produced without die expense or delay by DI-ACRO Benders, Brakes, Shears, Rod Parters, Notchers, Punches. Send for your free copy.

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All hot and cold rolled rods

Stainless steel

Chrome Molybdenum

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Many types of plastics

Fibre Rubber Wood



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Adding to its line . .

The Products formerly manufactured by
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built machines consisting of — Cut Master & Man-Au-Trot
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**LEACH 6X12
SURFACE GRINDER**

ONLY

\$485 00

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Look at that low price, then consider these facts carefully: The Leach 6 x 12 Surface Grinder actually handles 90% — yes, 90% — of the work of larger, far more expensive machines. It's a completely self-contained unit with a 2-speed ball bearing spindle, driven by a $\frac{3}{4}$ HP motor. It's accurate, time-saving, vibrationless, and proved to the hilt by hundreds of enthusiastic owners. Write to us for detailed description.



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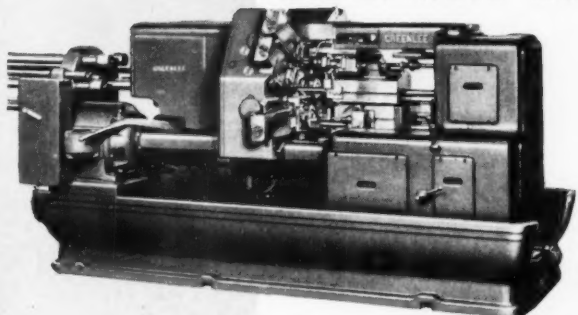
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GREENLEE Automatic Screw Machines are rugged, compact, surprisingly simple in operation and maintenance, and unusually versatile. *Check these time-saving and cost-cutting features.*

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All six cross slide cams can be replaced in less than 6 minutes, and only 13 cams handle 90% of the average job-shop requirements.

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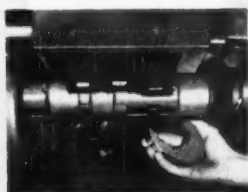
With identically machined tool cavities and interchangeable tool holders, Greenlee Automatics make quick job changes a cinch. You save in equipment costs, too!

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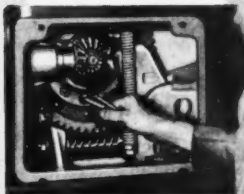
A graduated worm-wheel permits an accurate setting of the tool slide stroke in a simple, easy operation without guess-work, fuss, or bother.

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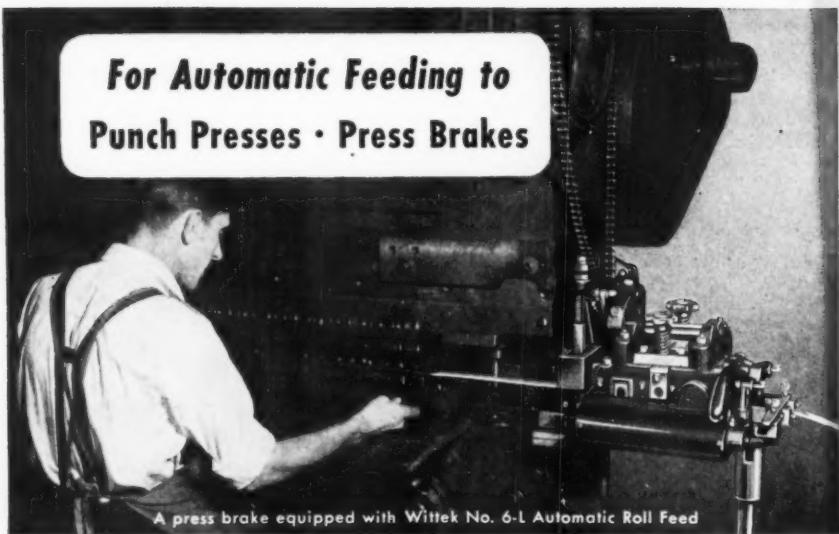
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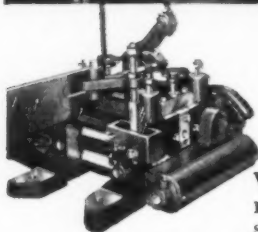
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A press brake equipped with Wittek No. 6-L Automatic Roll Feed

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Wittek Roll Feeds are made in standard models to meet every requirement in the automatic feeding of strip stock to punch presses or press brakes. The distinguishing feature is their simple and economical method of operation which does away with complicated parts thereby assuring *speed* and *accuracy* in the feeding of various kinds and thicknesses of material.

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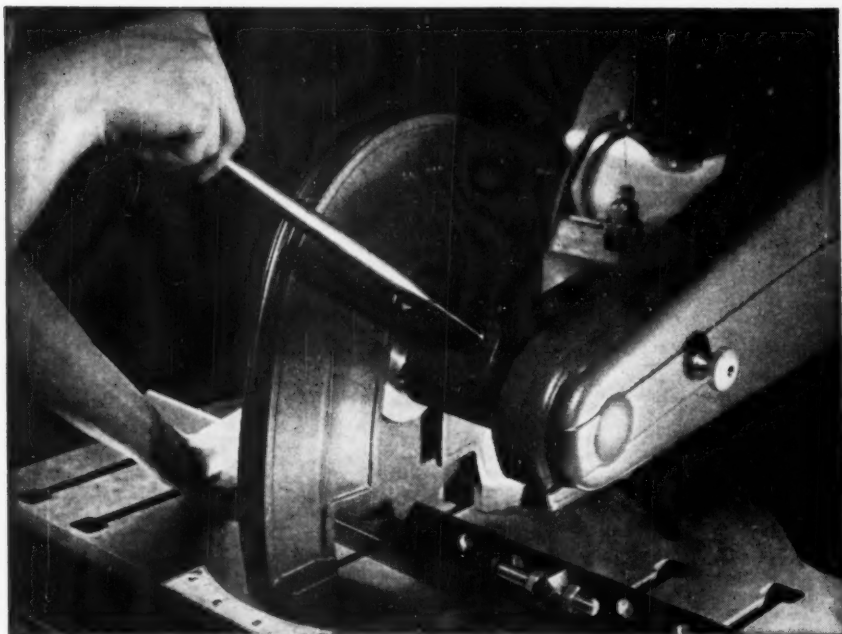
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***Automatic
ROLL FEEDS AND
REEL STANDS***





Before the Sparks Fly...

**MANHATTAN RESEARCH helps
solve your CUT-OFF PROBLEMS**

Backed by over half of a century of grinding wheel research, Manhattan Cut-Off Wheels bring you the most recent developments in both rubber and resinoid bonds. Manhattan Cut-Off Wheels are manufactured in a wide range of types and sizes—each especially designed to solve costly or perplexing cut-off problems.

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PRECISION

SURFACE PLATES



For layout, inspection or assembly line work

Available either precision ground or planer finished, Challenge Layout Surface Plates offer a perfectly smooth, square surface for layout, inspection or assembly line operations. Sizes range from 12"x18" to 54"x144". All are built of special analysis semi-steel.

The all-steel stand is arc-welded to furnish the rigidity of a one-piece unit. Special leveling screws enable the user to level the plate quickly and to lock it securely.

Standard plate thickness is 6". Thickness of 8", as well as special sizes, grooving, scoring, machining and slotting may be had to order. On special order, plates may be keyed so that two or more may be assembled into one complete unit.

For specifications, plus information on other Challenge equipment for the tool and machine industries, write today.

820

THE CHALLENGE MACHINERY CO.

GRAND HAVEN, MICHIGAN

IF SEEING IS BELIEVING *You* BE THE JUDGE

Builders of Multiple Spindle Automatic Bar Machines emphasize the importance of substantial FRAME SUPPORT to maintain accurate, dependable, low-cost machine performance.

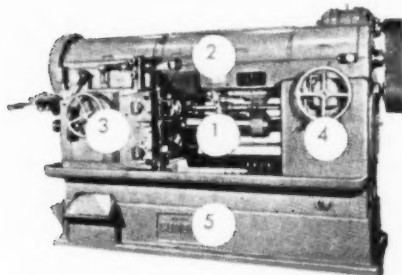
CONE long ago recognized this fundamental requirement and did something about it. In 1924 — in the CONOMATIC — an exclusive design of frame was introduced, a frame that made possible new and unequalled records for automatics in heavy duty forming and deep hole drilling operations, a frame that required no redesigning when carbide tools came along, and, a frame that remains today a standard for comparison in consistent, low-cost operation and maintenance.

CONOMATIC users benefit from the advantages of the CONOMATIC FRAME DESIGN, but you do not have to be a user to SEE WHY.

	MACHINE #1	MACHINE #2	MACHINE #3	MACHINE #4	MACHINE #5
WORK & TOOL CAPACITY	✓				
WORK & TOOL SUPPORT	✓				
WORK & TOOL MAINTENANCE	✓				

*CONOMATIC

Why not use a chart to guide your purchases of Automatic Bar Machines? If you are already using a chart, perhaps you would like to compare it with the one that we have prepared. Write to us for a copy or ask your Cone representative.



(1) TOOLING AREA

of Conomatics is of horizontal type, open, roomy, well supported. The operating controls are adjacent and on both sides of the machine. All tool slides are exceptionally well built and supported by liberal bearing surfaces, with convenient means of adjustment; all tool slides are designed to accommodate quickly and maintain more substantially a general choice of various types of tools — for standard or special applications. Quick change pick-off gears, for work spindle speeds, tool feeds, and rotating tool spindles, are provided for an exceptionally wide range of work; they are positioned to save time and motion in change-overs.

(2) TOP SUPPORT

of Conomatics is the revolutionary "top bed", which identifies all Conomatics. It houses the single unit camshaft and centralizes all cams in a truly accessible, visible, quick-change, chip-free position, clear of the tooling area. Conomatic cams provide a smooth, powerful, synchronized drive to all tool slides and power operated mechanism.

(3) HEADSTOCK SUPPORT

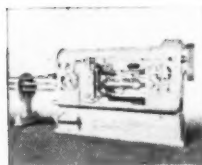
of Conomatics is a very substantial, triple unit support to the work holding and stock feeding members of these machines. It is the only multiple spindle automatic bar machine headstock support with an adjustment provision of both axial and radial take-up for the front bearing of the carrier.

(4) GEAR BOX SUPPORT

of Conomatics is a heavy-set unit that transfers and distributes power to the various functional mechanisms of the machine. It gives open-end facility to tool feed and attachment drive-gear change. It provides "direct drive" to all main toolslide attachment positions.

(5) BASE SUPPORT

of Conomatics is a massive, cam-free, bridge construction type of base member that supports the tooling area up close to the work and tool axis. It has a larger cubic foot capacity for chips and cutting coolant. Its size and weight is an important combination in the over-all support and maintenance of alignment that only Conomatic Frames can give to tools and work.



A comparison with ALL Automatics
will lead you to

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

#3



A Hanson-Whitney "Tandem Tap" embraces two distinct sections . . . the lower one for roughing, the upper for finishing...both sections being uniform in lead, providing added chip space, better lubrication to the roughing section.

This type is recommended only where conditions permit both sections to pass through the work . . . and preferably where the tap can be removed, without reversing.

If you have difficult tapping problems, steep leads, long threads . . . and if superior finish is essential, the results cannot be excelled. Moreover, this "Tandem Tap" will produce in *one* operation what generally requires *several* taps . . . a decided cost saving in production tapping. Available in any form of thread or limits.

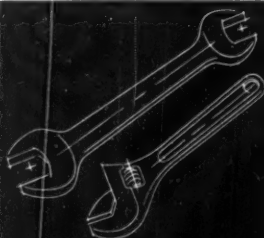
HANSON-WHITNEY MACHINE CO., HARTFORD 2, CONN.
Division of Whitney-Hanson Industries, Inc.



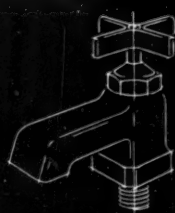
For practical recommendations submit your problems to Hanson-Whitney engineers

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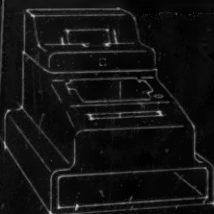
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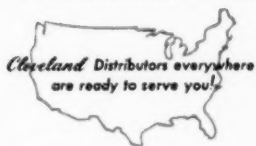
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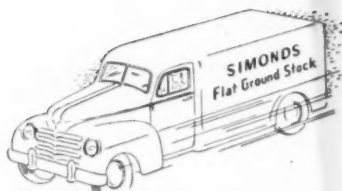
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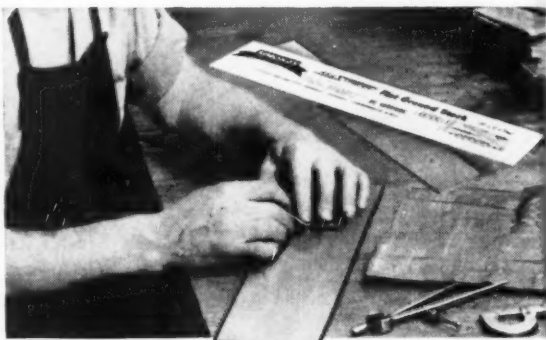
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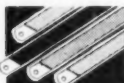
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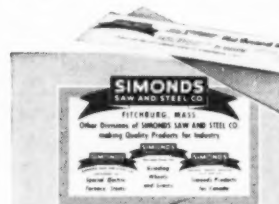


"Red Oak" Hacksaws



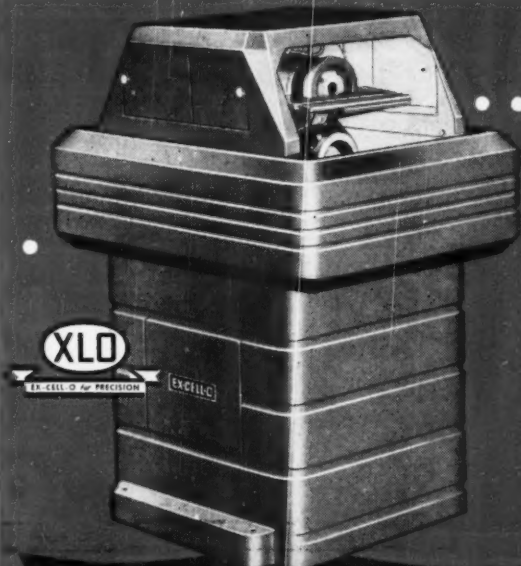
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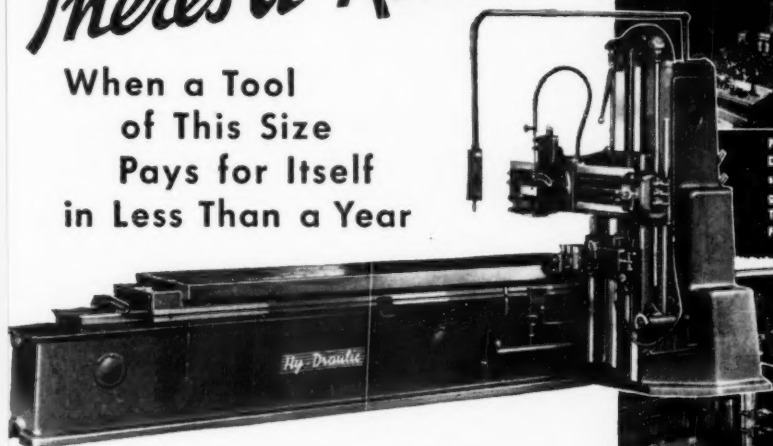
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There's A Reason

When a Tool
of This Size
Pays for Itself
in Less Than a Year



ROCKFORD *Hy-Draulic* SHAPER - PLANNER

Rockford *Hy-Draulic* machine tools, such as the Shaper-Planer illustrated above, have in many cases paid for themselves in less than a year in places where they have replaced obsolete or worn equipment . . . and have invariably increased production and lowered costs when replacing mechanically actuated tools.

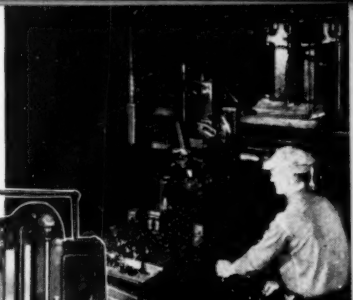
The reason? Superior construction of Rockford machines and unmatched efficiency of *Hy-Draulic* powered table drives and tool feeds . . . plus easy work set-up, easy machine adjustment, uniform speed for the full cutting stroke, rapid reversal and quick return. The result is precision work at high production speed.

Rockford *Hy-Draulic* Shaper-Planers are built in five standard sizes, with table stroke lengths from 42" to 144". Second cross rail head . . . and side head available as extra equipment.

You are invited to compare Rockford performance with that of your present equipment. We will be happy to make a machine time estimate on any part. Send your blueprints to our engineering department.

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ROCKFORD ILLINOIS

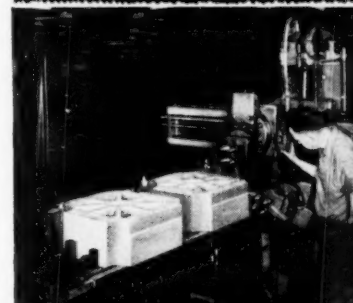
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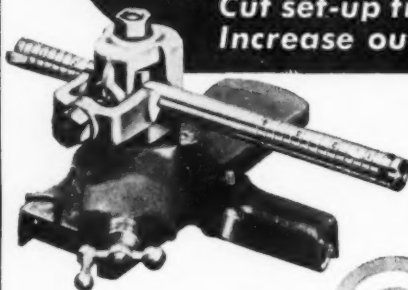


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Increase output ★ Reduce costs



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1-A	$\frac{1}{2}$, $\frac{3}{4}$, $1\frac{1}{4}$	$\frac{1}{2}$, $\frac{3}{4}$, 1	12" to 18"	26.35
2-A	$\frac{3}{4}$, $1\frac{1}{4}$, $1\frac{3}{4}$	$\frac{3}{4}$, 1 , $1\frac{1}{4}$	16" to 18"	35.15
3-A	$\frac{3}{4}$, $1\frac{1}{4}$, $1\frac{3}{4}$	$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$	20" to 22"	61.55
4-A	$1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{3}{4}$	$\frac{1}{2}$, $\frac{3}{4}$, 1	24" to 36"	87.95
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* $\frac{3}{8}$ " diameter bar included in set is solid tool steel.

INDIVIDUAL BARS (Calibrated)

Bar No.	Dia.	Length	Tool Bit	Price
162A	$\frac{3}{8}$ "	2"	$\frac{1}{8}$	\$3.50
122A	$\frac{1}{2}$ "	8"	$\frac{1}{2}$	3.50
123A	$\frac{3}{4}$ "	9"	$\frac{3}{4}$	3.50
124A	$\frac{5}{8}$ "	10"	$\frac{1}{2}$	3.50
125A	$\frac{3}{4}$ "	11"	$\frac{1}{4}$	4.35
126A	$1\frac{1}{8}$ "	13"	$\frac{3}{8}$	6.30

Bar No.	Dia.	Length	Tool Bit	Price
127A	1"	14"	$\frac{1}{2}$	\$6.30
128A	$1\frac{1}{8}$ "	16"	$\frac{3}{8}$	8.75
129A	$1\frac{1}{8}$ "	18"	$\frac{3}{8}$	12.30
130A	$1\frac{1}{4}$ "	23"	$\frac{1}{2}$	16.30
176A	$1\frac{7}{8}$ "	30"	$\frac{5}{8}$	36.35
155A	$2\frac{1}{2}$ "	36"	$\frac{3}{4}$	72.70

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- ★ Made from special tough non-chattering steel.
- ★ Tool bit hole broached in each end—one at 90°, other at 45°. ($1\frac{1}{8}$ " and $2\frac{1}{2}$ " Bars have one hole at 90° and other at 30°.)

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.20	.30	.20	.25	.30	.25	.35	.30	.45	.40	.75	.85	1.35	1.25	2.25	2.15	3.10

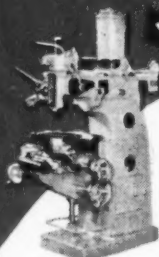
GLOBE PRODUCTS MANUFACTURING CO.
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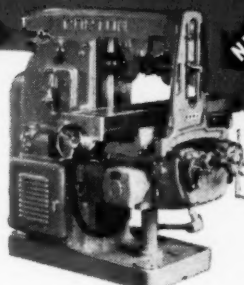
Send for your copy today. Gorton tracer-controlled milling embodies distinct advantages on the production line and in the tool room. In many cases, special tooling will make a given operation entirely automatic. Send for the Gorton Condensed Catalog illustrated above or for any of the other specialized bulletins described below—they were published for your information and reference.



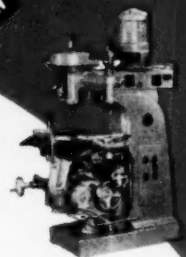
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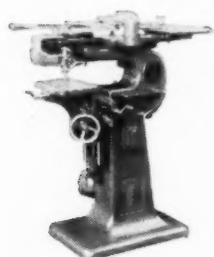
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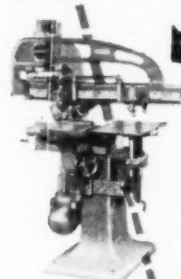
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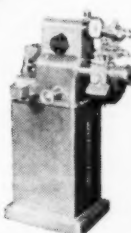
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When you need
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GEARED HEAD
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Mall FLEXIBLE SHAFT
REG. U.S. PAT. OFF. **GRINDER**

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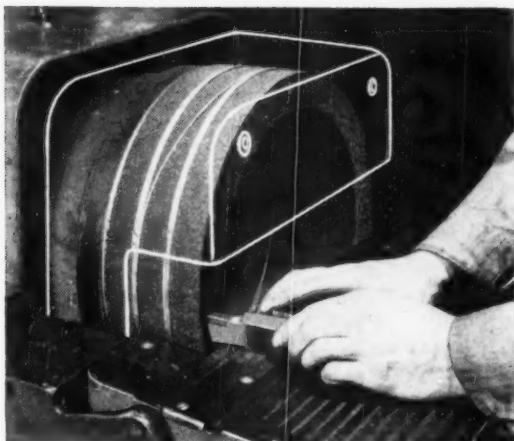
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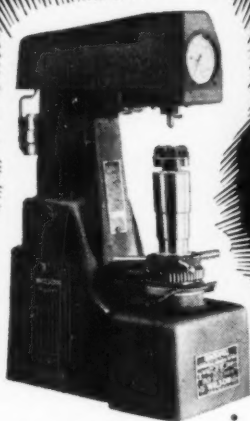
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MACHINE and TOOL BLUE BOOK

April, 1949

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Synchronized Speeds

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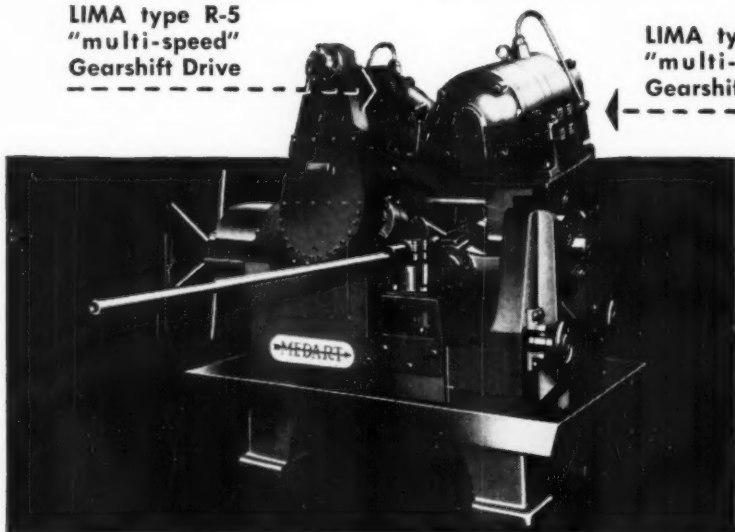
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gearshift drives

**for pipe—tube and
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and sizing machines**

LIMA type R-5
"multi-speed"
Gearshift Drive

LIMA type R-5
"multi-speed"
Gearshift Drive



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The Ultimate in Face Milling

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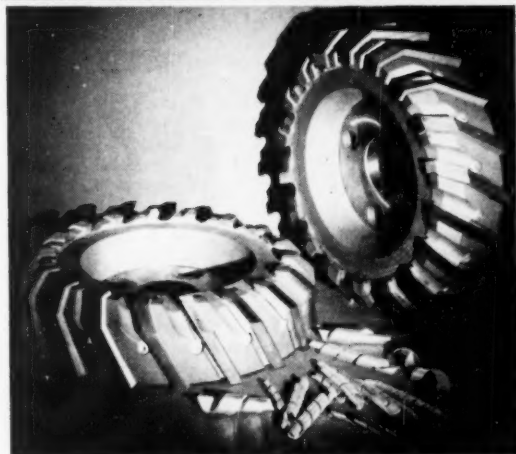
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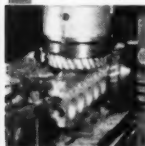
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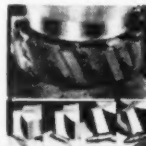
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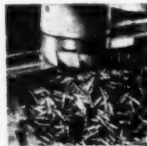
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Shear Clears with carbide tipped blades milling cast iron cylinder block at 48" per minute feed \$75 ft. min. removing 1.8-3.16" stock.



Note how Shear Clear chip is forced to coil out along the blade away from finished surface and is thrown clear of cutter at end of cut. This action produces smoother finish, faster feed, longer tool life, and less power requirements.



Milling SAE 9330 test block with 10" diameter Carbide tipped Shear Clear, 1/2" stock, 8" wide cut, 300 ft. min. 16 lead, 105 horsepower.

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regarding Roto-
Clone* wet-type
dust collectors to
which you should
have the CORRECT
answers.



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• Roto-Clone Bulletin 270A contains complete information on the design and application of both dry- and wet-type Roto-Clone dust collectors. Write for a copy today—it has the answers to your difficult dust collection problems.

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Answer—Scores of Type W and Type N Roto-Clones are functioning daily at better than 98% efficiency on small micron particles such as found in foundry sand handling systems; ore crushing and screening; material drying, roasting and sintering operations. In fact, it is not uncommon to obtain efficiencies of 99.5% on such applications.

Question No. 2—Does operation of wet-type dust collectors require a large volume of water?

Answer—The Roto-Clone system of bringing the dust to the water makes effective use of every gallon supplied. That's why the Type W Arrangement A requires the supply of less than ½ gallon of water for each 1000 CFM of dust-laden air cleaned.

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Answer—The cost of a Roto-Clone system is no more than that of other dust collectors of comparable efficiency. Actually, due to the small space requirements and factory method of assembly, the installed cost of a Roto-Clone is usually less.

AMERICAN AIR FILTER COMPANY, INC.

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ROTO-CLONE®
DUST CONTROL EQUIPMENT

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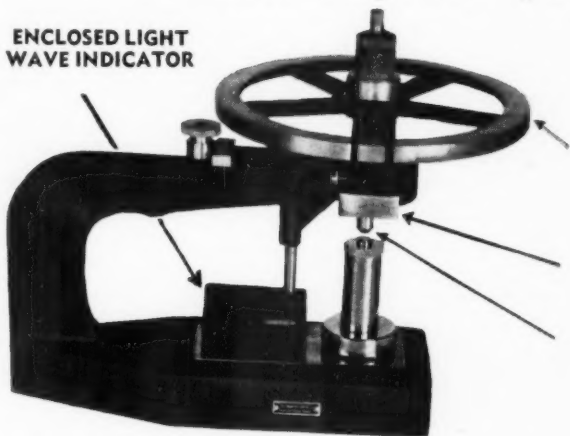
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CATALOG AND
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30th YEAR

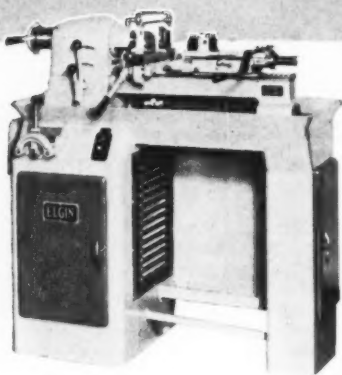
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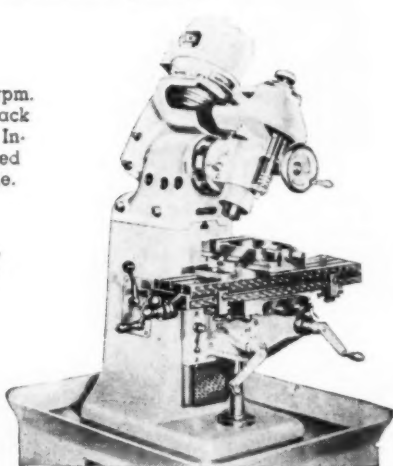
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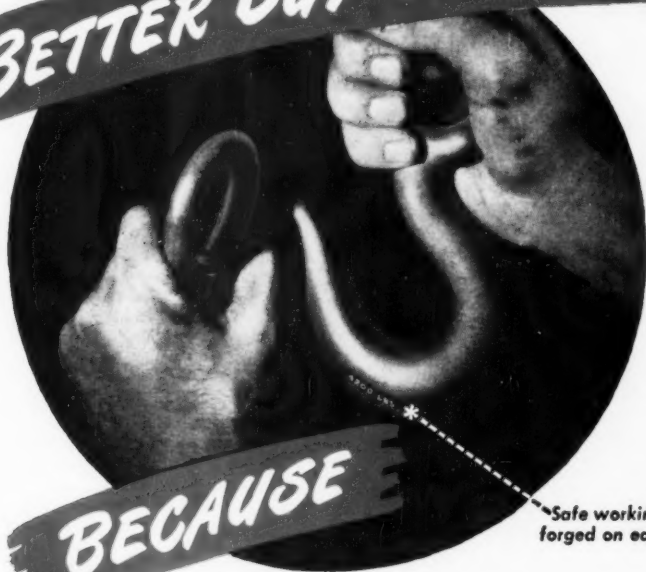
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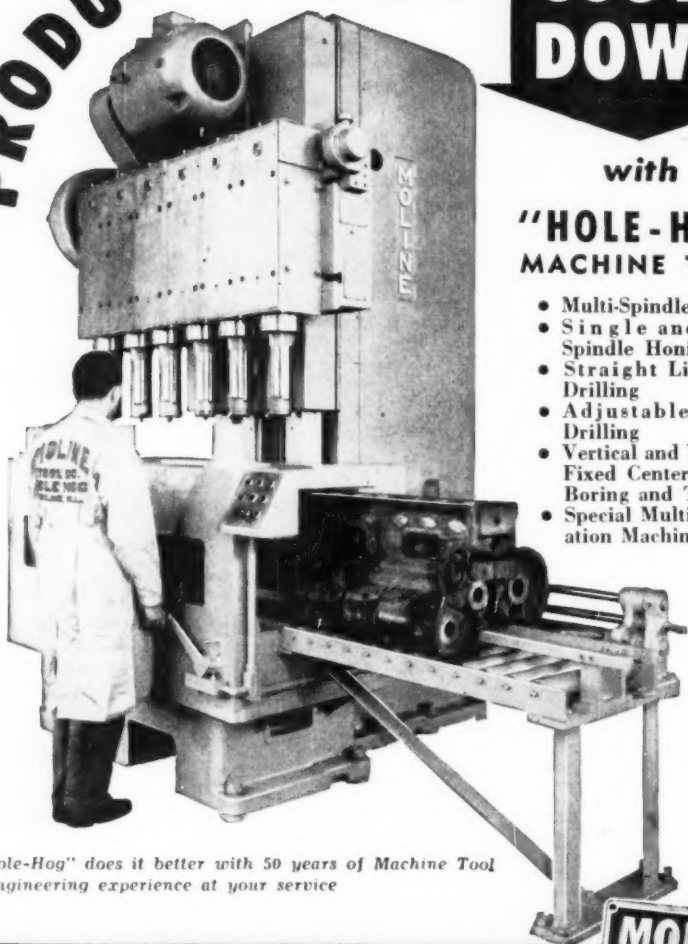
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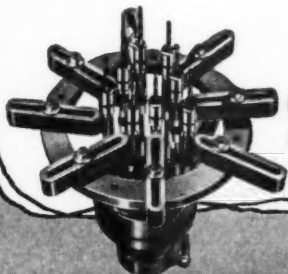
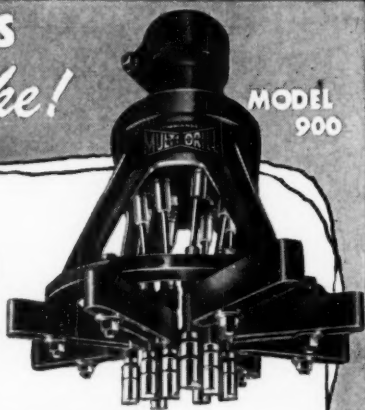
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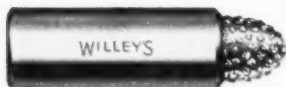
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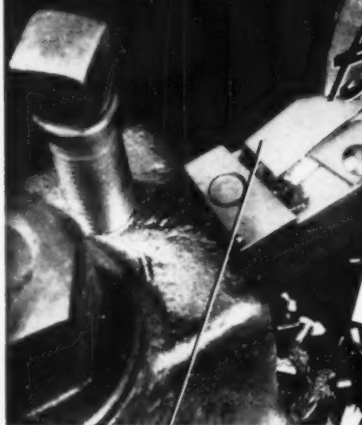
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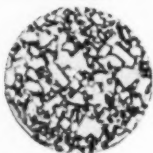
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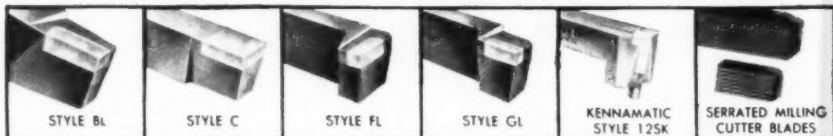
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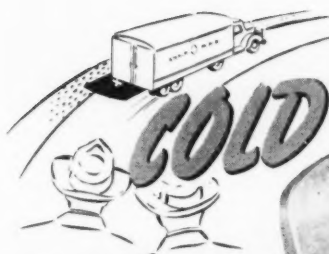


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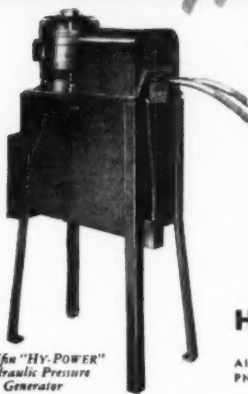
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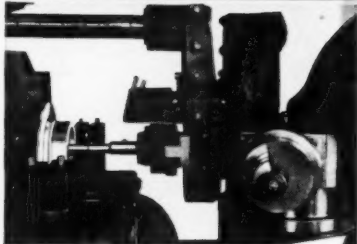
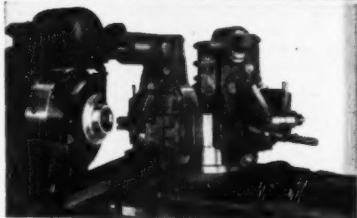
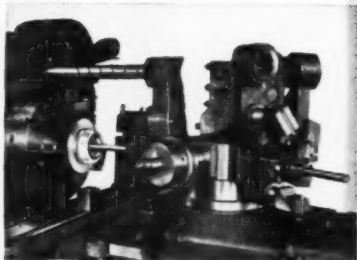


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Featured in this issue

MULTIPLE SPINDLE DRILL HEADS . . . THEIR APPLICATIONS AND CHARACTERISTICS, by H. K. Ferger. The intelligent use of drill heads can well result in considerable reduction in manufacturing cost, as well as in increased production. The construction and use of drill heads which are on the market today are discussed by the chief engineer of the Thriftmaster Co. Page103

FUNDAMENTAL PRINCIPLES OF DRAWING DIES, by C. W. Hinman. This is the second of three articles dealing with drawing of metals. The principles discussed in the first article (BLUE BOOK, February, 1949) are here applied on a typical drawing job employing three drawing operations. Page115

WHY DIES BREAK, by David R. Edgerton. Here's a down-to-earth article written by a heat treating engineer who knows many of the answers relating to the failure of dies and tools during heat treating. Design tips will, if followed, reduce the hazards of heat treating certain dies and tools. Page123

USING WELDED CONSTRUCTION FOR AN 18-SPINDLE AUTOMATIC DRILLING, FORMING AND BORING MACHINE, by E. M. Barrett. This company was faced with the problem of designing production equipment to meet an accelerated schedule. One of the machines designed was an 18-spindle machine. Instead of casting various members they were steel fabricated at a great saving in time and labor. Page138

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SHOP HINTS. Page155

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NEW BOOKS. Page168

THE STATE OF SMALL BUSINESS. Page172

WHAT'S NEW IN METALWORKING. Page181

SALES STRATEGY, by Swan E. Bergstrom, Lecture No. 14 in the NMTBA Sales Refresher Course. Fourteen lost orders are discussed, why they were lost, and how their loss could have been prevented. Some interesting examples of sales strategy can reduce the number of orders which are frequently lost. Page280

METHODS OF APPROACH TO CUSTOMERS, by E. B. MacDonald, Lecture No. 15 in the NMTBA Sales Refresher Course. The impression which the buyer gets of you as a person has a bearing on whether or not you eventually get the order or the gate. Some principles are here set down. Page293

NEWS OF THE INDUSTRY. Page299

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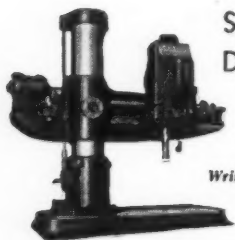
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Multiple Spindle Drill Heads...

THEIR APPLICATIONS AND CHARACTERISTICS



by

H. K. Ferger,

Chief Engineer, Thriftmaster Products Corp.

What type of drillhead is especially suited for your job? To answer this question requires knowledge of the various types of drillheads available today. Mr. Ferger, an engineer of over twenty year's standing, discusses the types of drillheads which are manufactured today.

S ELECTING the proper drillhead and making the best application for any job requires a knowledge of the various types of drillheads available, as well as an understanding of the many methods of applications commonly used. Many other factors enter into the selection, the most important being the rate of production, and the total number of parts to be produced, but this article will discuss primarily the types of drillheads available and give examples of a few applications.

Classified broadly there are only two types of drillheads: those having spindles on fixed centers and those having spindles which may be adjusted to varying centers. They are usually designated as fixed center and adjustable center drillheads. These types are further divided in reference to the method of mounting spindles and other rotating parts, some use full ball bearing construction and others run upon bronze bushings.

Fixed center heads are usually gear driven. A head of very simple ball bearing construction is shown in figure 1. There are some heads made of the gearless type, these have spindles with cranks on the

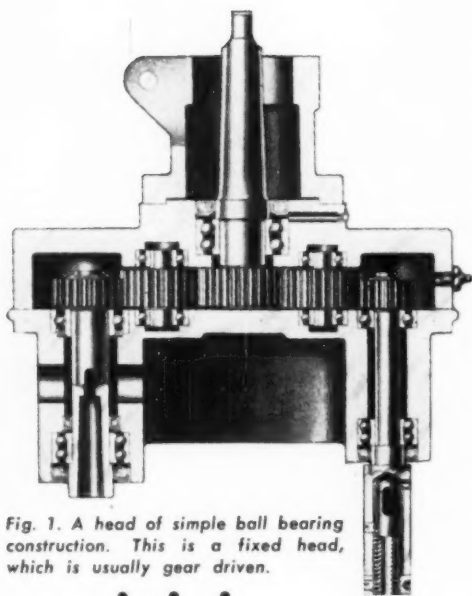


Fig. 1. A head of simple ball bearing construction. This is a fixed head, which is usually gear driven.

upper end and are driven by an oscillating plate eccentrically mounted. Drillheads have been built where the spindles were driven by belts, chains, or flexible shafts.

There are many designs of adjustable center drillheads, and a few typical styles are shown here. Figure 2 shows a gear driven enclosed head having universally adjustable spindles, that is, within a certain area the spindles may be moved in any direction. The section shown will also illustrate the usual construction of bronze bearing heads.

Another head of the universal adjustable type is shown in figure 3. This is generally referred to as the universal joint type. This example shows a head of ball bearing construction, although this style of head is also made in the bronze bearing type.

The head shown in figure 4 is generally made with only two spindles and shows an open type of construction (non-enclosed gears).

An enclosed type with full ball bearing construction is shown in figure 5, but this head is not universally adjustable as it is suitable only for holes equally spaced on circles when made with four or more spindles. In order to obtain the minimum center distance between two spindles only, this style head is also made in the offset type as shown by figure 6 in which one spindle is built integrally with the driver and the other is offset and adjustable.

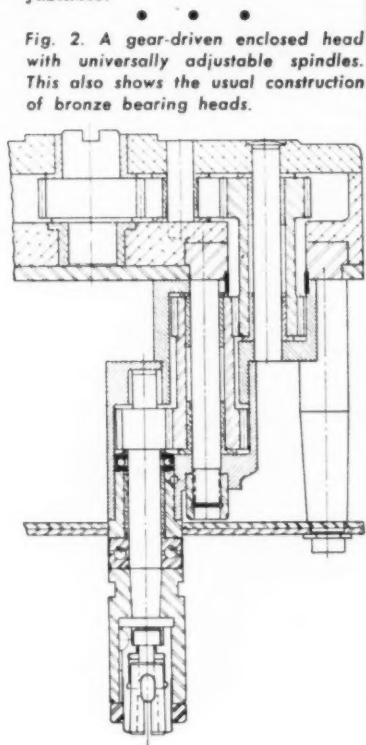


Fig. 2. A gear-driven enclosed head with universally adjustable spindles. This also shows the usual construction of bronze bearing heads.

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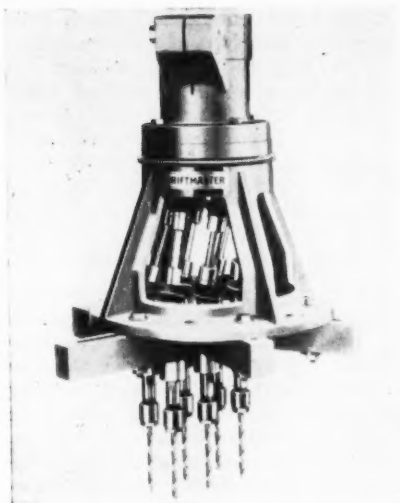


Fig. 3. This universal adjustable type head is usually referred to as the universal joint type.

• • •

When this type head is built with three spindles, having one spindle adjustable on each side of the integral driver spindle, it is adjustable for holes located equidistant on a straight line. Drill heads of this general design are being used successfully for drilling holes up to 2" diameter in cast iron at the maximum capacity of the drills. One point to be remembered when deciding upon an adjustable type of head for a job is that standard adjustable drillheads have all spindles running at the same speed and all of the same length.

Fixed center gear-driven drillheads are probably the most widely used as they possess many advantages, or possibly this should read "many advantages when correctly designed and constructed of proper materials".

A compact head reduces the possibility of interference with equipment



Fig. 4. This type is usually made with only two spindles and shows an open type of construction.

• • •

Fig. 5. A 4-spindle drillhead. This has a No. 1 Morse taper in spindles with conventional type of vertical adjustment. Spindles are adjustable for holes equally spaced on circles from 3.833" to 8.300" diameter.





Fig. 6. In order to obtain the minimum center distance between two spindles only, style head shown in fig. 5 is made in the offset type as shown in the above photograph. One spindle is built integrally with the driver and the other is offset and adjustable.

• • •

and light weight gives greater sensitivity of operation, requiring less counterbalancing weights on the drill press. When close centers are involved, staggered construction of gears and bearings should be used to secure proper strength.

All heads should have sufficient strength so that the tools can be forced to a breaking point without injury to the drillhead. They should be capable of giving at least 8,000 to 10,000 hours of service, depending on size of the job and materials used, with only lubrication maintenance; 20,000 hours should be expected where spindle locations will permit use of heavier parts, again depending on size and material. Each manufacturer has his own recommendation.

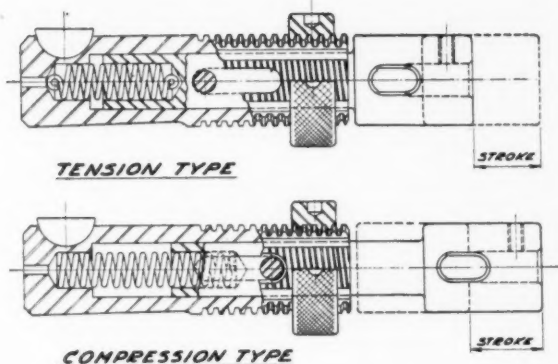
These fixed center heads can be provided with any type of spindles necessary to drive the tools being used, but usually this consists of a Morse taper socket or some form of drill chuck. When it is necessary to set the tools to proper depth to compensate for difference in length it is accomplished by using spindles with what the drillhead manufacturer calls vertical adjustment, and there are naturally several forms.

Not only can any fixed type of drillhead be furnished, but the spindles can also be made the proper length to compensate for tools of different lengths as well as different levels of working planes on the part being drilled or machined. Each spindle can thus be run at the proper speed to give the tool used the correct cutting speed so that all of the tools in the head operate at the most advantageous speed. Giving the spindles the correct speed also provides very nearly the proper rate of feed for the various size of drills. As an example, if a 1" drill were run at one-eighth the speed of a $\frac{1}{8}$ " drill it would have eight times the rate of feed of the $\frac{1}{8}$ " drill, which is very close to recommended practice.

Some heads are mounted by clamping the top or back face to a flanged portion of the machine. Smaller heads are attached by clamping upon the lower portion of the non-rotating quill of the conventional single spindle drill presses or to a flange, as some drill press manufacturers build machines arranged for a flanged connection for the drillhead.

Multiple tapping can just as easily be performed as drilling, and in many instances with the same head. All that is necessary is to use the head on a drilling machine having a reversing tapping mechanism incorporated. There have been heads built having provisions for reversing the individual spindles. If required, several different

Fig. 7. Most holders provide up to about .003" lateral float and may be either the tension or the compression type.



size holes may be tapped simultaneously with one head merely by arranging the gearing so that the spindles run at speeds proportional to the lead of the taps. For instance, if it were required to tap $\frac{1}{4}$ "-20, $\frac{5}{16}$ "-18, and $\frac{3}{8}$ "-24 holes, the spindles for the $\frac{1}{4}$ " taps would make twenty revolutions while the spindles for the $\frac{5}{16}$ " taps were making eighteen revolutions and the spindles for $\frac{3}{8}$ " taps were making twenty-four revolutions.

Some special heads are made having

the spindles provided with individual lead screws, and quite frequently heads are mounted upon tapping machines which are equipped with lead screws. Heads having individual lead screws on the spindles may if desired be obtained with a safety driving feature which will disengage the drive to the spindle whenever the spindle reaches a predetermined point of its travel in either direction. This is a very desirable feature, as it may prevent a serious accident due to failure of mech-

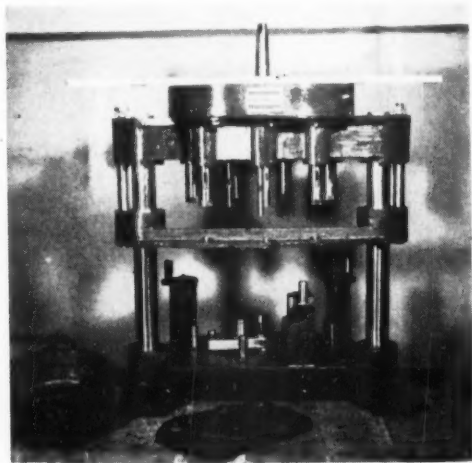


Fig. 8. One type of drillhead, suspended bushing plate, and fixture which was used for drilling a worm gear case and cover, as well as tap the case. This was done by placing tap holders in the spindles and removing the drill bushings from the bushing plate.

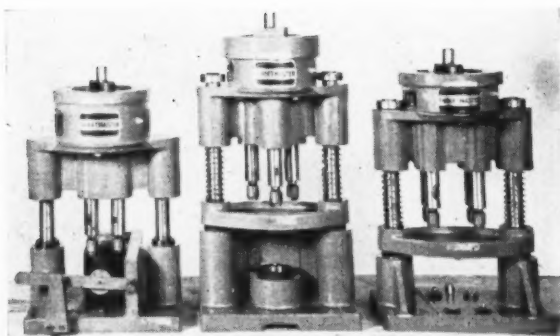


Fig. 9. Several types of tapping heads and fixtures.

anism to reverse at the proper time caused by mechanical imperfection or error in setting up.

In the most cases the taps are held with solid type holders in the spindles, but some users prefer floating type of holders. Most of the holders provide up to about .003" lateral float and may be either of the tension or compression type as shown in figure 7. When blind holes which have very little clearance at the bottom are being tapped the compression type of holder should not be used as the point at which the tap started to cut varies according to the method of grinding, sharpness of the

tap, and the strength of the spring, and in order to obtain a fixed depth it is necessary for all the taps to start cutting at a definite time. By providing sufficient compressive float, the tap may be allowed to recede into the spindle to take care of cases where the tap drilled hole may have been omitted due to carelessness or drill breakage in a cycling arrangement.

In a few instances tapping heads have been used in connection with small drill press tapping attachments by interposing the tapping attachment between the drill press spindle and tapping head. In order to maintain proper

Fig. 10. A fixture used with a drillhead. The part has twenty 5/16" holes located at 3/8" centers on a straight line. Fixture is provided with a loading and two operating stations so that one complete part is obtained at each stroke of the machine.



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alignment of the tapping attachment, head, and fixture, the fixture should be built with ample size rods over which the head and tapping attachment would slide and the weight of the head should be counterbalanced by placing springs around these rods between the head and the fixture.

Figure 8 illustrates one arrangement of drillhead, suspended bushing plate, and fixture which was used for drilling a worm gear case and cover shown and also to tap the case by putting tap holders in the spindles and removing the drill bushings from the bushing plate. Several tapping heads and fixtures are shown in figure 9. These heads were attached to a flanged quill type of machine which also had a lead screw, and the gear ratio of the heads was made so that they all operated with a ten thread lead screw on the tapping machine, therefore it was never necessary to change the lead screw of the machine.

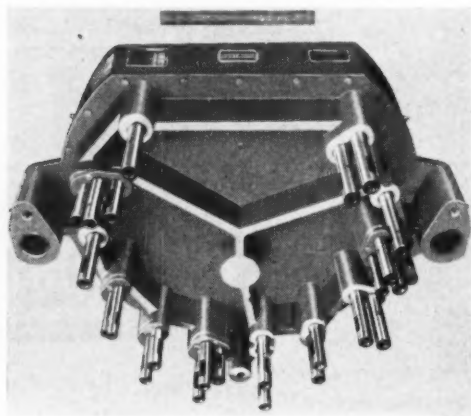
You will note that in all cases the tapping head and fixture are maintained in positive alignment by hard-

ened guide rods which enter hardened bushings in the jig base. This arrangement required very little setup time when changing from one job to another.

Indexing tables used in connection with drillheads provide a very efficient method of drilling parts where the holes are too closely spaced to be drilled at one operation or where it is necessary to perform multiple operations such as drilling, reaming, countersinking, etc., on the same hole. Figure 10 illustrates this method applied to the part having twenty 5/16" holes located at $\frac{3}{8}$ " centers on a straight line. The fixture is provided with a loading and two operating stations so that one complete part is obtained at each stroke of the machine. Note that here again the drillhead, bushing plate, and fixture are maintained in positive alignment by hardened guide rods, and these rods which enter hardened bushings in the fixture plate also provide a very accurate indexing location. This particular head would drill two different parts by merely changing the work-holding fixture shown, and these fixtures were

• • •

Fig. 11 and 12. Shown are the differences in sizes of various available drillheads.



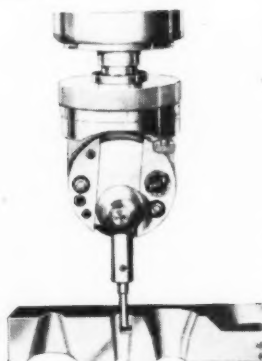


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accurately doweled in position on the index table for quick change over.

The drillheads shown in figures 11 and 12 will help picture the great difference in size of some of these heads. Note that the heads shown in figure 11 are provided with bushed lugs containing hardened bushings to work with guide rods. This is a very common practice although the fixture may be obtained from a different source. With present day precision machining facilities there is no difficulty in locating the bushed lugs of the drillhead and the guide rods in the fixture sufficiently accurate for satisfactory operation.

The savings to be expected from the use of a drillhead on the average is not directly proportional to the number of holes being drilled. For example, a four spindle head of the proper design will actually drill the part in

one-quarter the time required for single drilling, but the piece must be handled in and out of the fixture so that the overall savings will probably run between 85% and 90% of the direct ratio, giving in this case a figure of 28% to 29% instead of 25%. This 85% to 90% figure is only a rough average, and does not apply to indexing jobs where it may be possible to load and unload at the loading station during the time the piece is being drilled at the operating stations. In this case the time required per piece consists only of the actual drilling time plus the time to index.

When selecting a drillhead for any job it will be time well spent to investigate thoroughly the features of the proposed heads—as drillheads, the same as most all other equipment, are produced in a wide range. **THE END.** (Fig. 4 courtesy Linderme Machine & Tool Co.)

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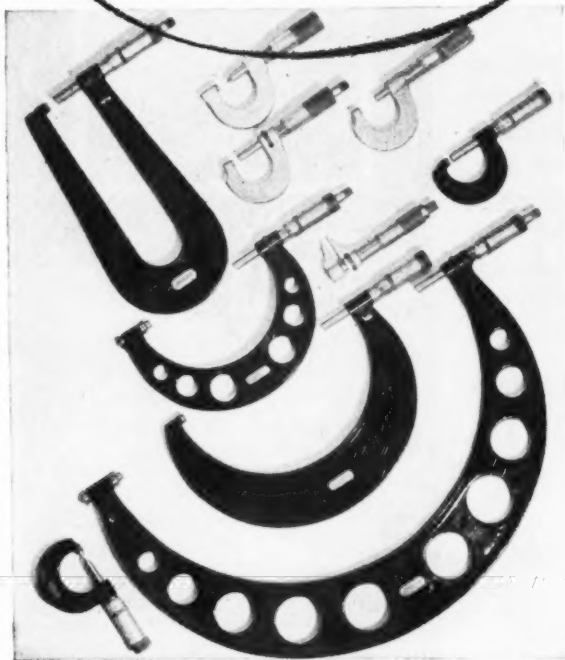


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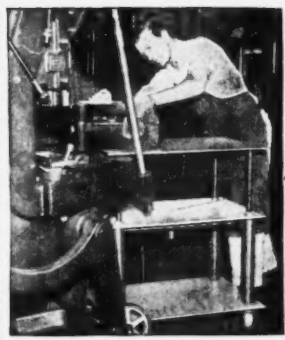
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FUNDAMENTAL PRINCIPLES

of Drawing Dies



by
C. W. Hinman,
Designing Engineer

In this, the second of a three-part article, Mr. Hinman discusses drawing presses in action. A step-by-step description of the drawing of ten-gallon stock-pots, (three draw operation) applies the principles discussed by the author in his first article, which appeared in the February issue of the **BLUE BOOK**.

SINCE we have discussed, in a previous article, most of the common principles upon which the operations of drawing dies are based, we shall now present illustrations of drawing presses in action, which are using drawing dies that embody some of those fundamental principles.

Samples of Drawn Parts

Figure 1 presents fourteen deep-drawn parts produced in Bliss drawing presses. Here are recent samples drawn into seamless products from aluminum and stainless steel sheets and strips. At the upper left, is a ten-gallon stainless steel deep-drawn can with handles attached. These cans are known to industry as "ten-gallon stock-pots." These pots are deep-drawn in three die operations, as discussed under Figs. 2, 3 and 4.

Other parts seen in this group are parabolic reflectors for head lights, a drinking tank with a faucet attached, several pots and pans used for kitchen utensils, and a tool cabinet with a hinged cover. This variety of drawn parts show the necessity for designing dies and presses having inherent flexibility. Pressmen don't just draw these kind of products of seam-

less aluminum and stainless steel alloys in any kind of a drawing die, nor in any kind of a drawing press. Drawing presses must be equipped with numerous adjustments for changing the die space, the crank strokes, and possess variable speeds. Only with this type of equipment can uniform speeds be maintained, with controlled drawing and press pressures throughout the full length of the press strokes.

Drawing Ten-gallon Stock-pots

This example is taken from practice because it is an excellent one showing the deep-drawing of stainless steel alloys, as these are tough metals to work in any kind of die operations. These samples are drawn smoothly and show no scratches or wrinkles.

Figure 2 shows the circular blank cut in a punch press, and the first, second, and third drawing operations for the ten-gallon stock-pot. The stock used is commonly known as 18-8, which means that it has a mild steel base alloyed with 0.18 per cent chromium and 0.08 per cent nickel. Lining the cutting and drawing edges of dies with brazed in carbide inserts, will lengthen die life 30 to 50 times, as compared with the best known types of high-speed steel dies, which is the commonly used material for dies that fabricate stainless steels. Stainless steel No. 18-8, is the easiest stainless alloy to work in drawing and forming dies, and is therefore most often used. Its chemical and physical properties for the annealed state follow:

Carbon	0.07 to 0.12%
Chromium	0.17 to 0.19%
Nickel	0.07 to 0.09%
Tensile strength, 90,000 lb. per. sq. in.*	
Elongation in 2 in. ...	35 to 40%
Brinell hardness	155 to 170
Weight per cubic inch....	0.3033 lb.

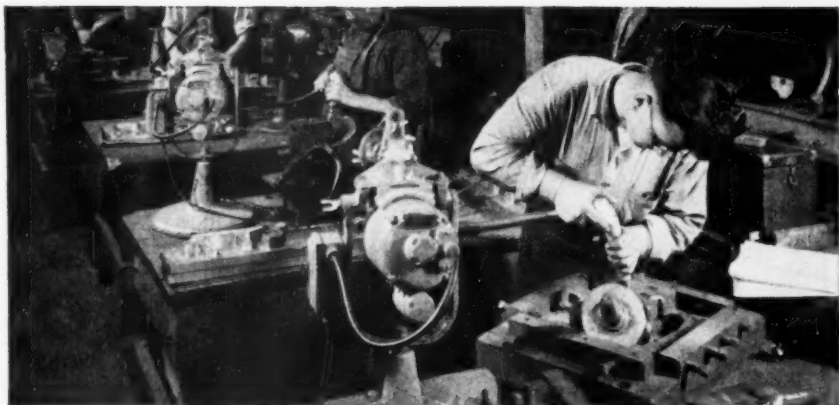
It is noticed in Fig. 5, that each drawing operation has a flared opening around its top. This curled over

rim facilitates stripping the can from the drawing punch, and tends to avoid drawing up an uneven top around the can body. The flare is subsequently trimmed and curled under itself around a wiring ring for strengthening the top. This operation is performed in a separate die set up in a wiring press. In drawing shells, and especially deep ones, it is always necessary to provide an air vent hole through the punch to eliminate vacuum in the can so that the shell can be stripped from the drawing punch easily. It is necessary to anneal the drawn parts between each operation. Annealing, or heat treating normalizes stainless steels so that drawing operations can proceed. Before annealing, parts should be thoroughly sand-scoured, and every vestige of lubricant removed. If the drawing lubricant is left on the shells through annealing, it forms a gritty abrasive substance which is very destructive to dies.

First Operation Draw.—In Fig. 2, the operator in the foreground places a blank over the die and centers it within locating stops. The man at the rear removes the finished shell after it has been drawn down into the die, and ascends to be stripped from the punch. The press used is a double-action hydraulic type. The photograph shows that the punch has been withdrawn up within the outer ram, and that the die itself is aligned directly underneath it, and secured in the press bed. The punch is attached to the inner ram, and the outer ram carries the blankholder pad which can be seen about 8 in. above the shell.

The blankholder ram descends first, and holds the blank down on the die face. The punch descent follows and

*Cold-working will increase the tensile strength to from 120,000 to 125,000 pounds per square inch.



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draws the blank down into the die opening. In drawing the shell, the punch pulls the blank out from under the blankholder, which holds the blank just tightly enough to prevent its forming wrinkles.

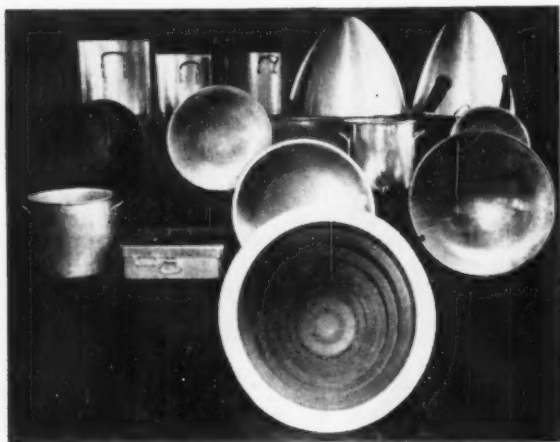
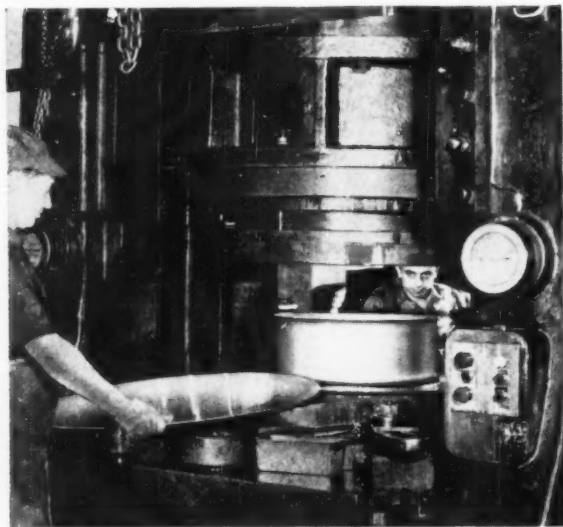


Fig. 1—A group of deep-drawn parts made from sheet aluminum and stainless steel alloys.

Fig. 2—Feeding the blank into the first drawing die which is set up in a double-action hydraulic press. The first draw is known as "cupping".



The cushioned pad within the die is activated by a hydraulic cushion attached beneath the press. When the punch ascends, the pad follows up under the drawn shell, until it has risen flush with the die face. The punch, continuing to ascend, carries up the shell to where it is "stripped off," when the rim around its top contacts the blankholder face. The man at the rear then removes the shell, and another blank is placed and the cycle is repeated.

Both the punch and die are highly polished for drawing stainless steels. It is customary to polish off the punch and inside the die walls, in the same direction as the descent and ascent of the blank and shell. This precaution helps to eliminate tool marks and scratches on the work, and these two faults are ever present in drawing all types of stainless steels. Dies should be polished after drawing about 100 shells; doing this reduces the cost of extra polishing on the work after drawing. All

drawing radii entering the die opening, and those on the nose of the punch should be as large as possible to permit an unhampered flow of the metal around the punch and down into the die.*

*A booklet entitled "How to Fabricate Armo Stainless Steels," is published by The American Rolling Mill Company, Middletown, Ohio; it is for free distribution to those who are responsible for tooling results.

Second Operation

Draw.—Figure 3 illustrates the press and press tool for redrawing the second operation of the stock-pot. Here we see a redrawn shell finished on the die, the punch has just withdrawn from it, and the operator in the foreground stands ready to place another cupping shell to be redrawn when the rear man has removed the one on the die. The press used is also a double-action type. The punch seen in the photograph has a diameter equal to that of inside the cupping shell held in the operator's hands. The drawing punch is within the punch seen in the picture. The outer punch is the blankholder, and in this case prevents wrinkles in the wall of the cupping shell while the inner punch draws it down into the die.

This tough, heavy gauge stainless steel is deep-drawn in three operations to smooth, wrinkle free, finished sized shells, with an intermediate annealing between operations. However, deter-



Fig. 3—The second redrawing operation of the stock-pot in a double action hydraulic press.

• • •

mination of the maximum percentage of diameter reductions, possible to make in any one redrawing operation, is largely dependent upon experience.

A few words may not be amiss here on the functions of double-action presses. These machines are of two types: one in which the outer ram, or blankholder, is cam actuated, and another in which it is actuated by toggle links. These presses are made in bench sizes and up to other sizes large enough to draw a complete turret top for an automobile.

The principle application of double-action presses is blanking and drawing, but they are also used for hot sizing and forging and for a number of other purposes where two related



Fig. 4—The third and final redraw performed in a large toggle joint drawing press.

• • •

operations are necessary. In the case of redrawing the stock-pots, a sleeve

is brought down by the outer ram and enters the shell to be redrawn, while a punch on the inner ram descends and pushes the shell down through the redrawing die. When the punches ascend, a pad within the die ejects the redrawn shell, which continues to ascend on the inner punch, but is finally stripped off by the outer punch as the inner punch ascends to its maximum height. In this way, the shell to be redrawn is centralized over the die before the operation begins, and wrinkles are prevented by the outer punch which controls the flow of the metal while it is being drawn into the die.

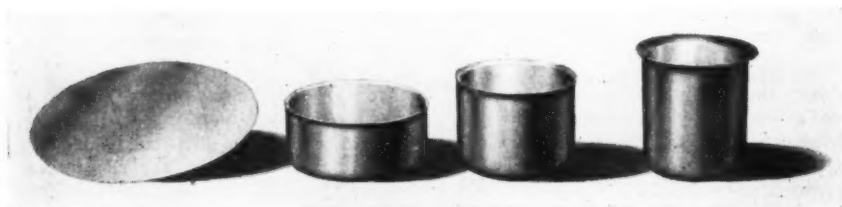
Third Operation Draw. — Figure 4 shows the final redraw and finishes the stock-pot as shown at the right-hand end of Fig. 5. The operating details of this redraw are practically identical to those described for the preceding redraw.

The gross output of work produced in each of these redraws is approximately 80 shells per hour. A lubricant must be either painted on the shells with a brush, or by dipping before redrawing, and this consumes considerable time.

Photographs courtesy of E. W. Bliss Co., Detroit 2, Michigan. End of Part 2.

• • •

Fig. 5—Showing the blank and three consecutive drawing operations of a ten-gallon stainless steel stock-pot.



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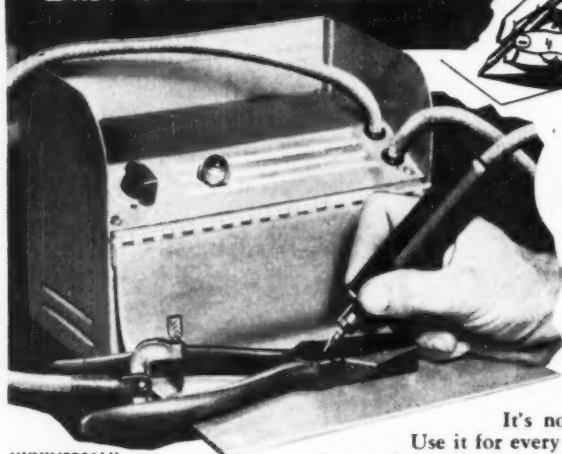
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WHY DIES BREAK



by
David R. Edgerton

Here are a few answers to the perennial question of: why do dies and tools crack during heat treating? The author, a heat treater of long experience, discusses the reasons for some failures, and plants a few guide posts that will remedy some of the causes. Design of tools plays an important role in whether or not dies will fail during the heat treating cycle. The proper selection and the identification of tool steels, as well as methods of testing and inspecting them, are discussed.

TO OUR WAY OF THINKING, two of the most important ingredients that go into the successful and satisfactory tool or die, are common sense and experience. All too often most of us have occasion to call on these two stellar old-time virtues when "impossible" jobs are turned over to the heat treat department. And, sad to relate, even if the heat treater is the best in the business, he cannot make a silk purse out of a sow's ear, and hold a die together that would be plenty tough to treat under any condition,—but that comes to him marked "Air Hardening" and turns out to be "Water Hardening"! There are certain definite requirements of cost as related to productive life which enter into the manufacture of tools and dies. While costs are important, the actual cost of a good piece of tool steel in the bar or forging is usually infinitesimal as compared to the final cost of the completed part. Why gamble on an unknown brand, or a cheap substitute, or an unidentified bar, when the odds are 100 to 1 against you? Not only the tool work and the steel cost go into a failure. There is also the loss of productive time and the intangible loss of morale and confidence.



Fig. 1. Punch made of water hardening steel.

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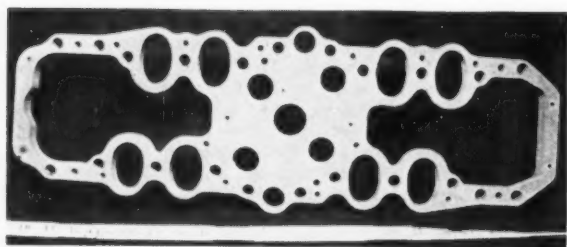
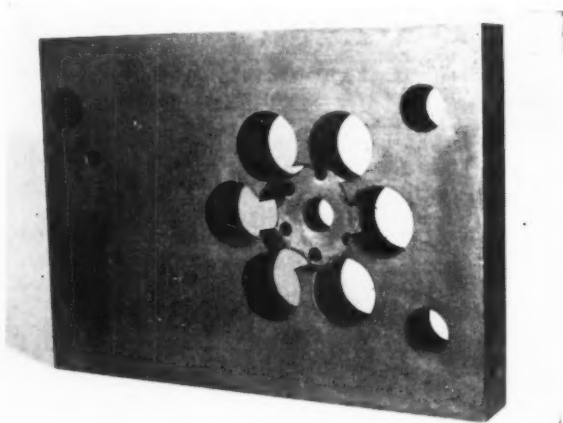


Fig. 2. Gasket die made of oil hardening steel.

• • •

Fig. 3. Blanking and forming die made of high carbon-high chrome.



CHOOSING THE RIGHT STEEL

So how do we go about choosing the right steel? Let's take advantage of all of the valuable experience and common sense in our respective organizations. We believe that only by close cooperation between the tool designer, the tool maker, the steel supplier, and the heat treater, can errors in the specification of tool steels be minimized. Add to the experience of your own personnel, that of the steel supplier.

Every first class reputable purveyor of tool steel maintains a service organization. Use their service and advice in the purchase of steel, and use the advice and experience of your steel treater.

After cooperation, we feel that simplification is the most important item in choosing the right steel. Stick to a few standard types of tool steel and be very sure that every man in your organization is thoroughly acquainted with the uses, characteristics and limitations on those few grades. Except in a few highly specialized shops, four types of tool steel: water hardening, oil hardening, high car-

bon-high chrome, and high speed, will cover 95 per cent of all requirements. Figures 1, 2, 3 and 4 show typical parts made of these steels. Figure 1 shows a punch that might well be made of water hardening steel. The gasket die in figure 2 is a good application for oil hardening tool steel. Figure 3 shows a die used for blanking and forming composition material. A die of this type can be made of high carbon-high chrome. Figure 4 shows a reamer that should be made of high speed. Simplification cuts storage overhead, minimizes the chance for error in identification; and promotes uniform results through familiarity of each man with the material with which he works.

Beware of "single purpose" steels. They have their place and should be used as intended and not for every job that happens to come along.

We remember a good friend of ours to whom we recommended Silico Manganese spring steel for punches. He was punching 11/16" square holes through the curved web of 5% Manganese rail stock, varying from 3/4" to 1" thickness. High Speed and water hardening tool steel punches snapped like glass, pulled off or bent over, depending on the temper. The Silico Manganese averaged better than 500 holes, and was our friend Sold! Right off the bat he started using Silico

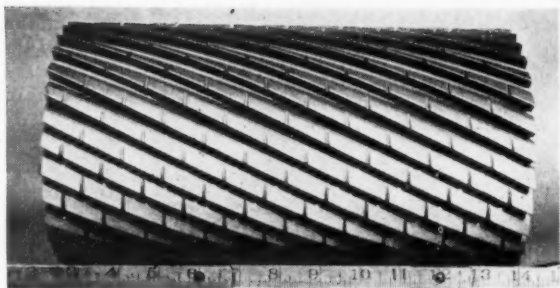


Fig. 4. Reamer made of high speed steel.

Fig. 5. Method of storing steel bars in jobbing warehouse. Photograph courtesy Abell-Howe Company showing installation for Carpenter Steel Co., Chicago.



Manganese for dies, tools, reamers and what have you, with complete disregard for the required properties. It took us a long time to unsell him.

Again it is a sad frailty of human nature to follow the lines of least resistance in choosing a piece of steel for the job. "We don't have that oil hardening tool steel that the designer specified on the print, so let's substitute water hardening, medium carbon alloy, or even cold rolled, and to heck with the poor heat treater who has to harden it and the tool maker who has to try and fit it and set it up." You

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think that's an exaggeration? You'd be surprised how often the heat treater has heard that story: "I couldn't get tool steel the right size, so I made it out of 1020. Yes, it's finished right to size, can't have any warpage or size change." Sometimes the heat treater pulls a rabbit out of his hat and does the impossible, but quite often the results are sad and disappointing.

And so, we add to our pleas for **Cooperation** and **simplification**, one for **patience**. Don't use the wrong steel just because it is handy or cheap or easy to machine. It usually takes a lot longer to make up a replacement than to wait a few days for a forging or a mill shipment of the right steel from the right source.

MIXED STEELS

One of the causes for hardening room grief is "mixed steels". This is one of the most prevalent causes for cracking tools and dies. The steelmaker avoids errors by carefully coloring each bar of stock, each size is separated, and each type of steel is kept away from other types during storage. It would be well for you to follow some of the precautions of the steelmakers so that the possibility of using the wrong kind of steel will not happen. It would help to 1. simplify purchases, using only the grades and sizes necessary to meet your average requirements, 2. set up engineering specifications to utilize a minimum number of sizes and grades, 3. keep an accurate stock room inventory and provide sufficient storage facilities so that designated grades may be available but separated.

As to the identification of grades, your supplier may have a system of colors that you can borrow or, if not, he may be willing to paint your bars before delivering them to your stockroom. If you paint your own, we suggest painting bars all over with solid color. A chart should be made available to all employees so that colors may

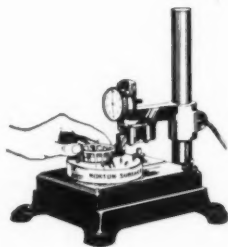
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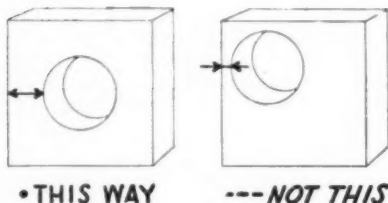
It is strongly recommended that each bar in your present stock and in new shipments be spark tested. We have in past articles recommended cutting discs from bars of questionable analysis and deep acid etching. These same discs may be hardened, fractured tested for proper hardness, and properly identified. If there is still a chance of variation a chemical analysis for the principal alloys and for carbon may be run in your own lab, or by a reputable commercial chemist.

DESIGN OF TOOLS AND DIES

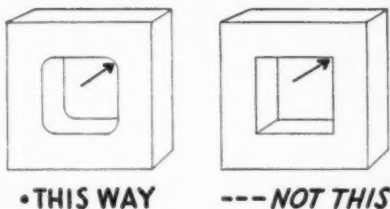
The ultimate consideration in designing a tool or die should be satisfactory production of required parts at minimum unit cost. Too many dies are designed without consideration for this principal requirement and without the application of common sense and good judgment in considering the heat treating hazard.

And why should this "heat treating hazard" be so important?—because it is the final stage in the completion of the tool or die. All the blood, sweat and tears of design, tooling and set-up have been put into that chunk of metal and one slight error of judgment in design can cause heat treating failure and the scrapping of every man hour consumed in bringing the part up to its completion.

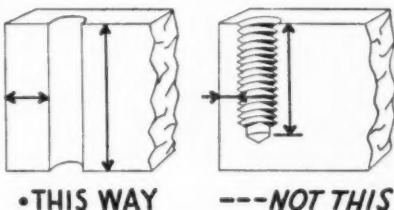
- (1) Equalize sections—to permit uniform stress distribution during quenching.



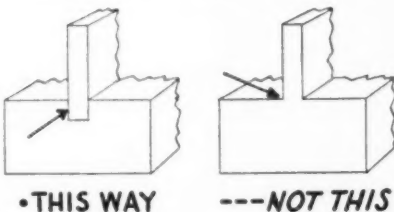
- (2) Add fillets—to minimize "notch effect" and stress-cracks starting from sharp corners.



- (3) Eliminate blind holes and tapped holes, wherever possible, and keep such holes away from the edges of the tool or die.



- (4) Simplify—use inserts where thin walls or deep impressions interrupt the continuity of cross sections.



We believe that most designing errors leading to hardening failure might be eliminated by the application of a few simple rules:

YOUR PRODUCT REFLECTS
THE QUALITY OF YOUR DIES

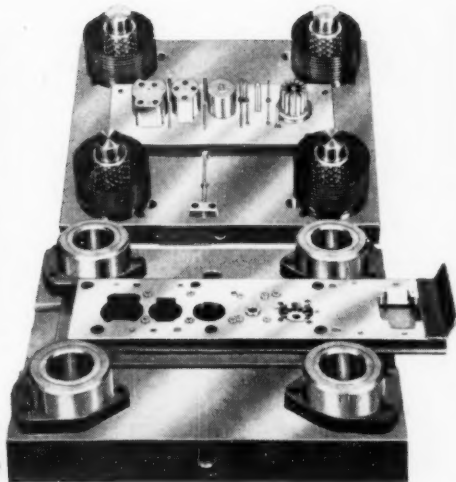
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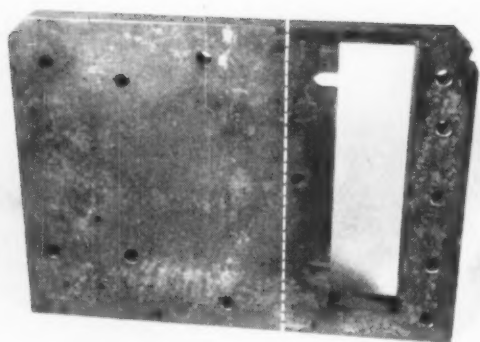


Fig. 6. (top) Blanking die. Dotted line shows how die might have been made in two pieces, thus equalizing the sections and minimizing the possibility of cracking.

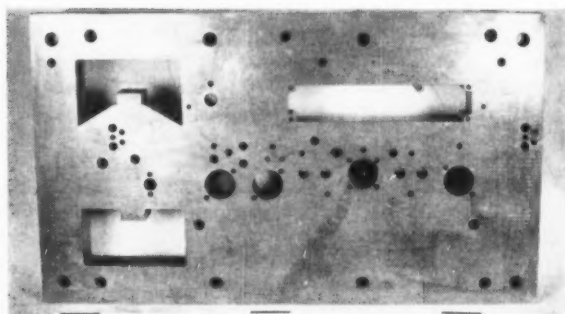


Fig. 7. (middle) Blanking die. Note sharp angles in upper left hand corner.

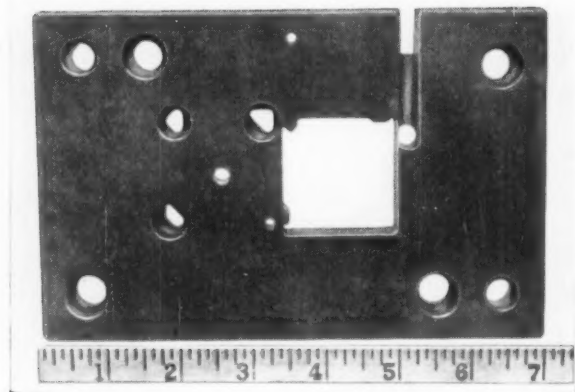


Fig. 8. (bottom) Note unusually thin wall between center cut-out section and recessed slot of this forming and blanking die.

Take figure 6 as an example. Can you imagine any logical reason why this blanking die could not be made of two pieces so that the cooling rate would not have been so unequal? Five minutes discussion with a tool hardener should have been sufficient to develop the logic of splitting the die as shown by the dotted line — thus equalizing the sections and minimizing the possibility of cracking.

Let's suppose that you are a steel treater—and someone hands you this die made of oil hardening tool steel. How would you approach the problem of hardening it uniformly to 60-61 Rockwell-C? You know that the thin walls at the ends of the oblong impression will cool much faster than the drilled end-section, and that the drilled end-section in turn will cool before the heavy solid mass on

the other side of the slot. If you're lucky you can get permission to drill five or six holes in the end-section to help minimize the mass differential (as was done with the die shown). The heavy, solid section may be quenched first—approximately to the dotted line—and thus, if you've had twenty years' experience and have a whale of a lot of luck, you can guess when the heavy section is cool enough and the thin sections are still hot enough to quench out hard so that a minimum differential stress is set-up and the die holds together without giving off that disheartening "PING!" — that spells disaster! But you're not through yet—even though the die is still in one piece. There has been a "bowing" of the thin sections due to differential cooling and the die must be "hot straightened" under the press. There are no "fillets" or rounded corners in the impression to help overcome the 'notch effect" and again — if your experience is sufficient and if your luck holds—you will straighten the end to its original measurement, removing the pressure at just the right moment before the die takes a "permanent set" and

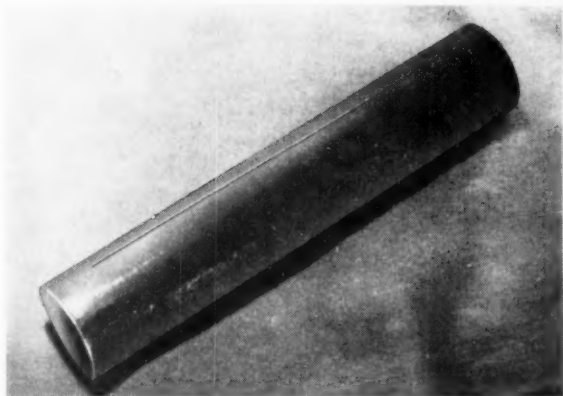


Fig. 9. Note surface seam as indicated by magnetic inspection. (Retouched)

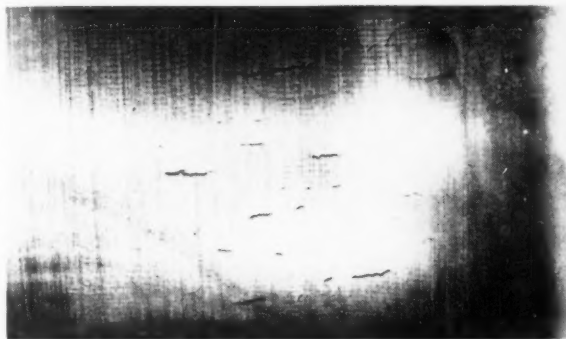


Fig. 10. Surface checks in forged bar indicated by magnetic inspection.

Fig. 11. Magnetic inspection has been used to show the center defect in this aircraft engine master rod. (Retouched)

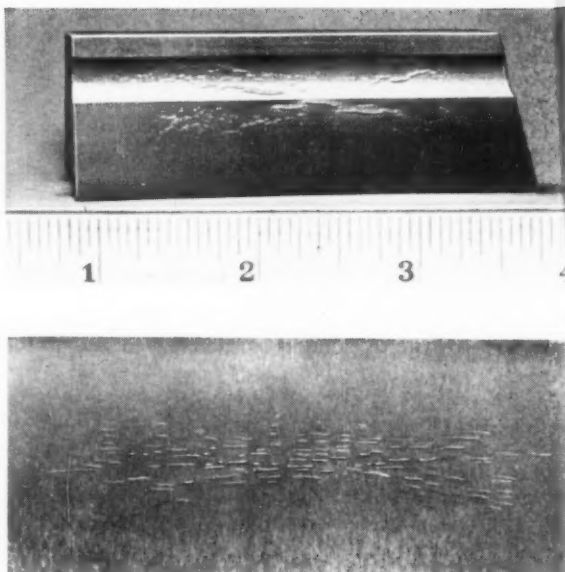


Fig. 12. (top) Magnaflux test shows lineal center cracks or voids running through the center of this tool.

Fig. 13. (middle, top) Transverse section cut from bar adjacent to tool shown in Fig. 13. This shows condition indicated by Magnaflux test. (Retouched)

Fig. 14. (middle, bottom) Longitudinal section cut from same bar — again showing conditions indicated by Magnaflux test shown in Fig. 13. (Retouched)

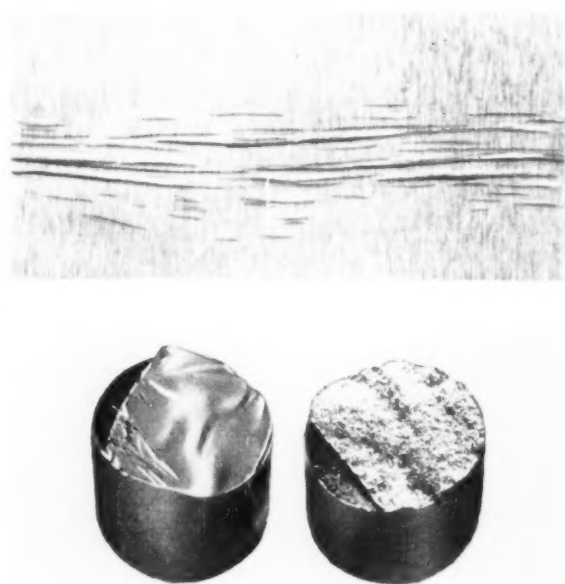
Fig. 15. (bottom) Fractured bars from steel of identical analysis. Note variation in grain structure.



blows up. Then into the draw and add a few more gray hairs!

And how simple would have been the hardening of the same die if it had been designed in two pieces. Even sections holding their shape would be almost a "sure thing" bet for satisfactory hardening and service instead of a 100 to 1 shot and utter dependence on superhuman hardening.

Now to figure 7. This one is not so tough as far as the mass differential is concerned but look at those sharp angles in the upper left hand corner. Wouldn't it have been smart to fillet them even though a few hours of hand grinding might be required subsequent to hardening? And some-



thing might be done about the oblong slot at the upper right. It's going to take plenty of care to keep those $\frac{1}{8}$ " walls around the five small holes from chilling and popping off. Couldn't they be filleted or inserted?

And now we have figure 8. The filleting is swell but who in heck is going to harden that $\frac{1}{32}$ " wall between the outer impression and the recessed slot without cracking it and what kind of strength will it have in service? A simple two stage die for blanking out the center after the swaging and punching operations on the balance of the blank would cost a little more but would virtually eliminate the treating and operating hazard, thus substituting a good safe bet for the long shot.

QUALITY AND INSPECTION OF TOOL STEELS

When a bar or a forging of tool steel is laid on your doorstep, the chances are at least a thousand to one that the steel is free from surface and center defects, that it is "normal" as to structure, that it is annealed for machinability and in the best possible condition for hardening and for holding to size during the final treatment.

We are here considering the one occasional error that creeps in, despite the care and inspection that your reputable tool steel supplier has given his product from the choice of quality scrap for his furnace charge, through all the melting, pouring, forging and rolling processes, to the final disc inspected, surface etched, and magnetic tested product.

Over a period of years, we have learned to identify abnormalities of steel and to take steps to keep them from following through to the final expensive die and tool. The most expensive steel in the rough bar or forging may cost \$5.00 per pound, but when the tool maker has finished, it may well be worth \$500.00 per pound.

What cheap, inexpensive methods

then can be set up in the tool room to eliminate the possibility of failure due to faulty material, and what constitutes "faulty material"?

SURFACE DEFECTS

Surface defects such as cracks, seams, figure 9, laps, and checks, figure 10, which are not entirely removed by surface machining, may cause cracking during heat treating, particularly when accompanied by surface decarburization.

To prevent such failure, it is recommended that surface inspection be made after machining to the approximate finished size. Such inspection may be made by magnetic testing or by acid etching. Here is the recommended equipment and procedure for the acid etch test.

Equipment: A gas or electrically heated standard hot plate of suitable size is used to heat a lead, lead lined or other acid resistant tank. The acid is a mixture of equal parts C. P. Hydrochloric Acid and water and is heated to 160° - 180° F.

Procedure: Die blocks or tool blanks or discs are cut from bars or suitable sized rough forgings. Safe tolerances are— $\frac{1}{16}$ " material removed from all bars and $\frac{1}{8}$ " from all forgings. Rough machined blanks are wired and immersed in hot acid for 20 to 40 minutes, rinsed with hot water, brushed, dried and examined for defects.

CENTER DEFECTS

Center defects such as pipes, center bursts, figure 11, excessive center segregation or dendritic center, due to lack of proper reduction during the hot working, are all possible causes for failure in treating.

Again the acid etch or magnetic test after rough machining is recommended, with visual examination of cross section. If parts are made from bar stock, $\frac{1}{4}$ " to $\frac{1}{2}$ " thick discs may be examined.

There are two or three methods of magnetic testing in use today. The

Magnaflux method has been used on the high speed tool shown in figure 12. The tool has been magnetized and submerged in iron oxide. Oxide adheres to the entire tool but adheres in greater quantities at points where voids or imperfections appear in the surface or interior structure.

Figure 13 is of a transverse section cut from bar adjacent to tool shown in figure 12 (acid etched).

This actually shows what the magnaflux test indicates in figure 12.

Figure 14 shows a longitudinal section cut from the same bar (acid etched). Here again we actually see the bad interior condition that was indicated by the Magnaflux test shown in figure 12.

HARDENING AND FRACTURE TEST

For the hardening and fracture test the following equipment and procedure is recommended:

Equipment: A power hack saw is used to cut off a $\frac{1}{4}$ " to $\frac{1}{2}$ " disc from

the end of a rough machined bar or forging.

Procedure: Disc is treated by heating, and quenching in the appropriate medium—air, oil or water.

Nicking the hardened disc and fracturing through its greatest diameter will give you a visual picture of the grain structure to be expected in the finished part. On the tougher alloys, a slight saw cut will facilitate the fracturing of the disc.

Figure 15 shows fractured pieces of $\frac{3}{4}$ " bars (not discs). Note the variation in grain sizes. The coarser grained bar will be more brittle than the fine grained bar. This shows the variation in grain structure that sometimes exists in bars of identical analysis.

In spite of the most careful handling, sorting and segregation of various types of steel and analyses, errors may occur in the steel mill, warehouse or in your own stockroom. Unfortu-



Here's protection against those forgetful moments when tragedy lashes out to claim its toll.

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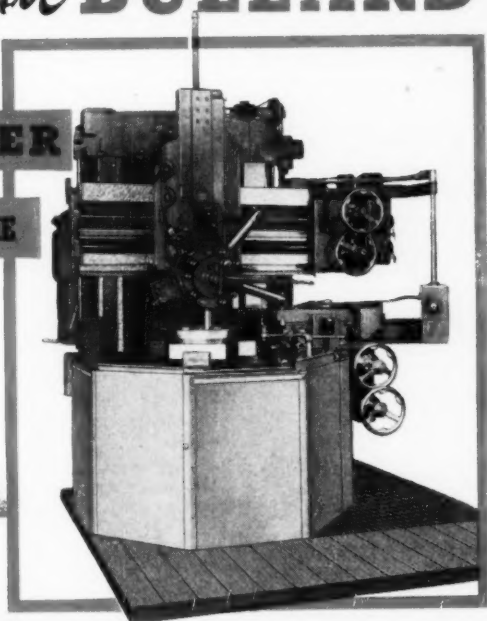
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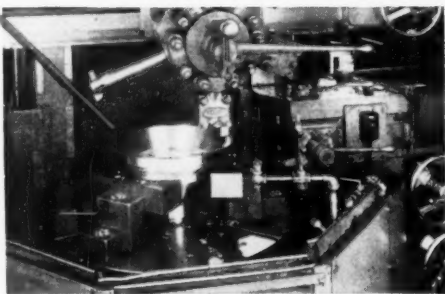


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In 3 chuckings, 380 lbs. of stock was removed in 14¼ hours from a stainless steel forging of this bowl shell. Such an excellent finish was obtained, that a previous polishing operation was eliminated.



nately, a bar of oil hardening very closely resembles a bar of water or air hardening steel. And don't try to tell me it can't happen in your shop. Some of our best operated plants have "picked the wrong bar." I very distinctly remember receiving 10 large shell reamers made from 12" dia. x 3" thick forging sent to us as High Speed Steel. After a total investment of \$200 each for steel and machining, it was discovered by the Heat Treater that all 10 were made of SAE 1020! Impossible but sadly true. A quick easy method for identifying analyses is by the spark test. Here's the equipment required and the recommended procedure.

Equipment: Any bench or portable grinder with wheel diameter of 2 to 8 inches and capable of surface speeds from 7,000 ft. to 8,000 ft. per minute, may be employed. A fairly soft, fine-grained wheel is preferable. The operator should be furnished with a set of

standard samples of all the steels used in your production for comparison.

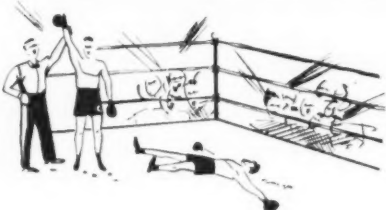
Procedure: All bars and forgings are tested upon receipt, stamped with grade number or name and stored. Questionable bars are held out for further check.

Are all of these precautions too much trouble? Maybe so—but bear in mind that a disc cut from each bar, acid etched, inspected, hardened, fractured, and sparked may cost as much as \$3.00 and that dies, tools or machined parts cracked in hardening due to concealed abnormalities or mixed steels may cost you a hundred or a thousand times the \$3.00. That's rather cheap insurance! (This material appeared in Heat Treating Hints, published by the Lindberg Engineering Co., and is here reprinted with permission. The BLUE BOOK will present further articles in this series when available.) THE END.

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isn't
just
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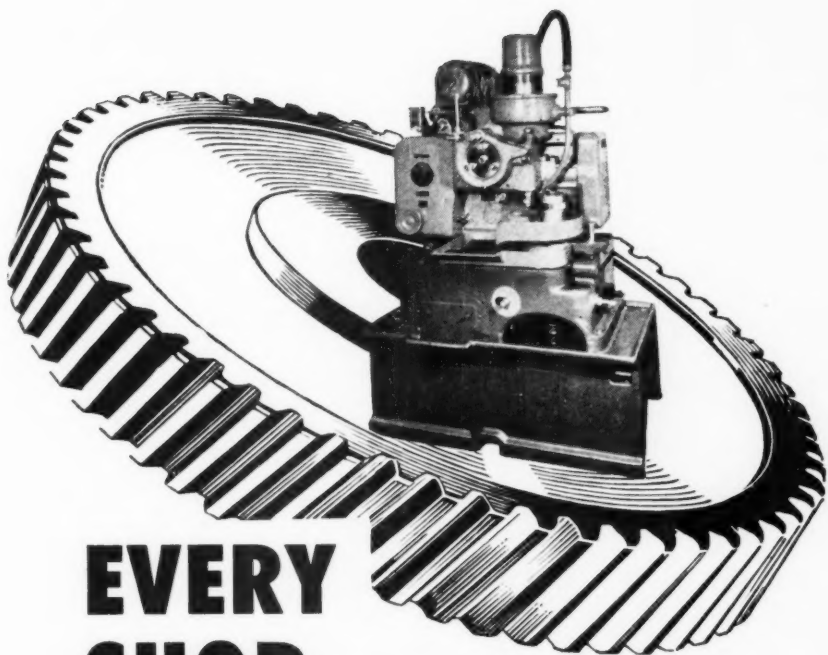
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137

USING WELDED CONSTRUCTION FOR AN *18-Spindle Automatic Boring, Forming and Drilling Machine*

by

E. M. Barrett.

Plant Superintendent, Clayton Mig. Co.

When a special machine was needed to meet production requirements it was steel fabricated. The cost of steel fabrication was \$1600 compared to a cost of \$8930 if castings had been used. Design and construction of this machine is discussed by the author.

THE DEMAND from our sales department for 10,000 Clayton Water Softener Valves per month was sufficient to warrant considerable thought and expense in the design of new equipment which would perform a number of operations simultaneously. The thought of combining and deducting operations gave me the idea of building an 18-spindle automatic forming, boring and drilling machine with an indexing table which would enable the operator to perform all 18 operations simultaneously and load and unload a finished casting while the machine was in operation.

After consultation with my colleagues and management, it was decided to: first, to make it vertical for the purpose of easier tool adjustment and a clear vision to all stations at all times; second, we would use a hydraulic unit to actuate the rapid traverse; third, we decided to make this machine fairly flexible because we have some other very similar jobs in our plant which are fairly high volume and could be run on this type of a machine at a great savings; fourth, we decided in favor of the steel fabricated design because of the great saving in original expense as well as the saving in time.

After a rough layout was completed and everyone's good ideas were incorporated in it, a work order was made out to produce the complete job. Free hand sketches were made of all the steel plates. These sketches carried the work order and assembly number so that they would be accumulated on flats in the cutting room and go to the correct welding booths without being mixed up.

The machine base, which was also the hydraulic oil reservoir, was made out of $1\frac{1}{4}$ " boiler plate with a 4" radius on all four corners and a $\frac{1}{2}$ " x 6" mild steel band, with beveled edges, was wrapped around the under side of the $1\frac{1}{4}$ " top plate and tacked flush to the outside edge of this plate. Four $\frac{3}{8}$ " x 6" mild steel cross pieces were laid inside this wrap around band and welded every 2" with a 2" single pass weld. These four strips were intended to serve as oil baffles, as well as ribs, to take out any deflection of the top plate. They were also welded on the ends to the inside of the wrap around band. A $\frac{3}{8}$ " thick floor plate was then laid in place and lined up to match the outside of the wrap around and tacked in place.

The assembly now being held together properly with tack welds on the outside and all the welding done on the inside, it was placed on a welding positioner and a good single pass weld was run around the top and bottom butt joints. To form the bolt

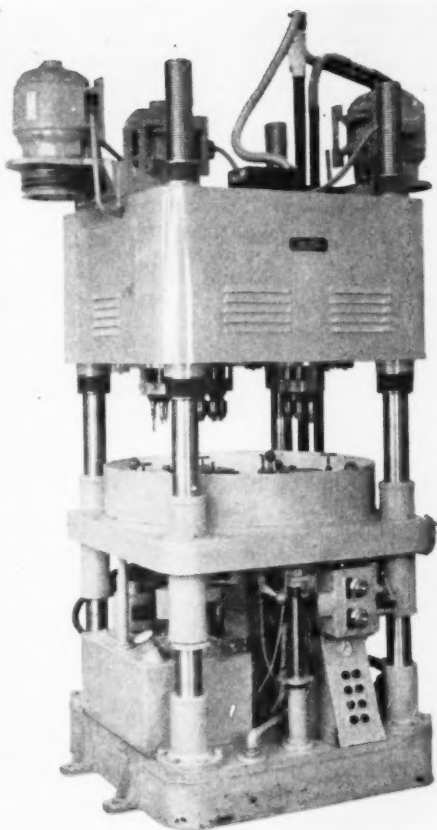


Fig. 1. An 18-Spindle automatic forming, boring and drilling machine for the production of water softener valves. The machine is hydraulically operated to actuate rapid traverse, feed and quick return cycle of the work table; it is so designed that it can be readily adapted to other jobs besides the one for which it was designed. The machine is steel fabricated because of the saving in original expense as well as the saving in time.

down lugs, eight gussets were fillet welded to the sides of the wrap around and also to the four bolt down pads.

The index table base was also made of $1\frac{1}{4}$ " boiler plate and a $\frac{1}{2}$ " x 3" mild steel band butt welded in the same manner as the base assembly. At each corner, a 4" xx pipe was fitted through a hole provided and four $\frac{1}{2}$ " boiler plate gussets were tacked both to the pipes and the table plate proper. All these joints were then fillet welded requiring three passes. To the top side of this index table base, three rings of mild steel were tacked in place, then double fillet welded. One of these rings was to serve as a coolant reservoir, one to be a chip deflector and the other was to be a ball bearing flat race.

The index table assembly consisted of a $1\frac{1}{4}$ " x 36" round boiler plate with a $\frac{1}{2}$ " x 3" band beveled and double fillet welded to the bottom side. The center bearing hub and a ball bearing flat race band were also double fillet welded to this plate. After the two above assemblies were completed to this stage, they were stress relieved and straightened, then two ball bearing flat races were built up to dimension by applying two layers of $\frac{1}{8}$ " Wearweld Electrode which were later ground flat in the machining operations.

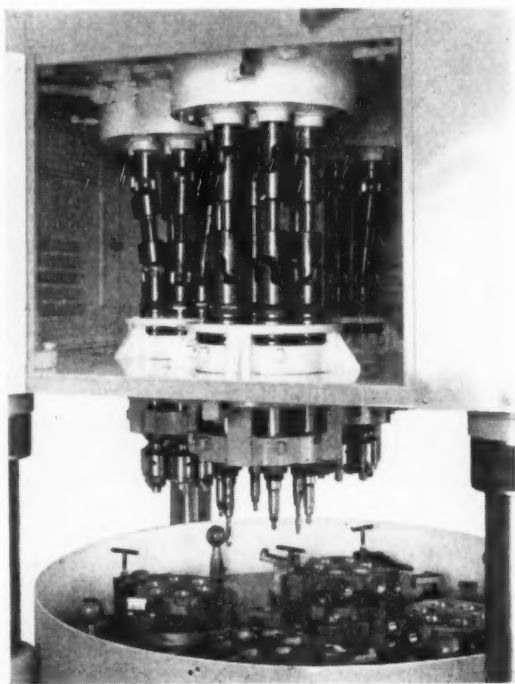
This unique method of producing a ball bearing surface was given to me by one of our welders and proved to be very satisfactory and much cheaper than my old method of bolting on hardened and ground tool steel with its multiple machining and grinding operations.

The coolant tank was produced out of 14 ga. S.P.O. sheet and as this unit was not required to hold pressure, we merely broke up a wrap

around sheet to form the bottom two sides and top. We then placed the two ends in flush and tacked them in place, thereby squaring the tank and then running the longitudinal weld. The ends were welded tightly.

The three gear boxes, and covers for same, were fabricated out of $\frac{1}{2}$ " boiler plate, $\frac{1}{2}$ " x 5" mild steel and Shelby tubing for the bearing hubs. The torch cut on the O.D., laid out and drilled all together to assure the proper location of the bearing hubs in the final machining operations. The

Fig. 2. A rotating indexing table permits the operator to perform all 18 operations simultaneously and load and unload a casting while the machine is in operation. On the index table two ball bearing flat races were built up to dimension by applying two layers of electrode which were later ground flat in the machining operation.



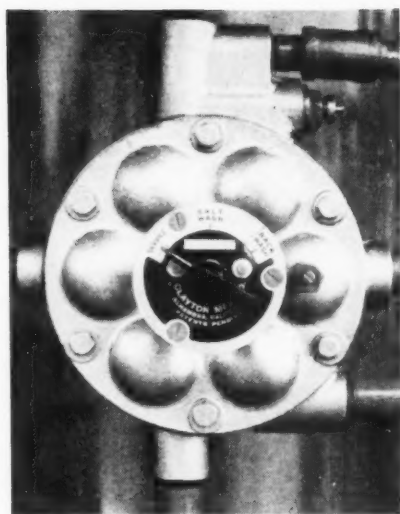


Fig. 3. The completed valve in service on the Clayton water softener.

• • •
 $\frac{1}{2}$ " x 5" bands were chamfered, rolled and welded tightly into hoops. All these parts were then chamfered in the lathe and welded into assemblies.

The motor bases were fabricated out of $\frac{3}{4}$ " boiler plate. Our machinery was not heavy enough to bend this plate, so we torch cut and beveled three

• • •
 Fig. 4. The machine base which also serves as hydraulic oil reservoir.

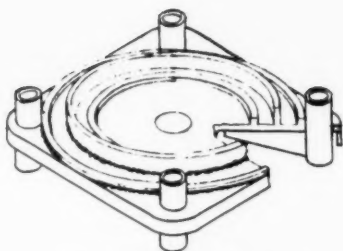
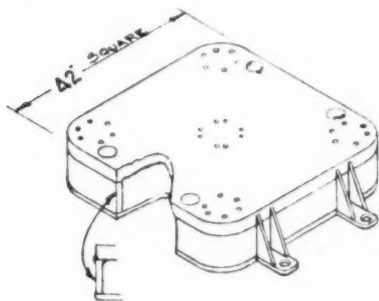


Fig. 5. Index table base.

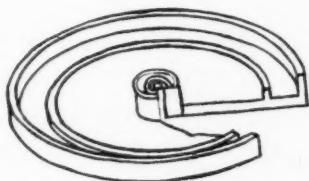
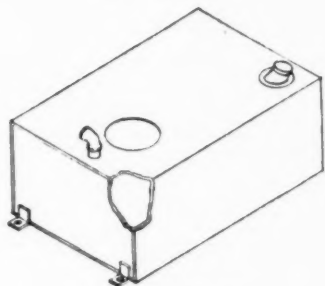


Fig. 6. Index table (bottom view).



• • •
 Fig. 7. Coolant tank.

pieces and welded them into shape.

The spindle housings required considerable thought, both in regard to their design, as well as their fabrication. As you will note, we are not using any drill bushings or drill jigs over the castings in production so this necessitated extreme rigidity of the spindles. This was accomplished by designing the straddle bearing housing which supported the spindles at both

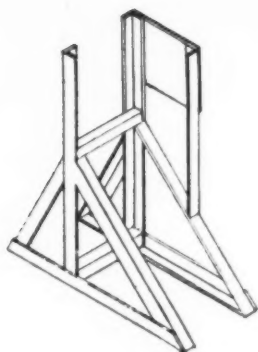


Fig. 8. Control stand.

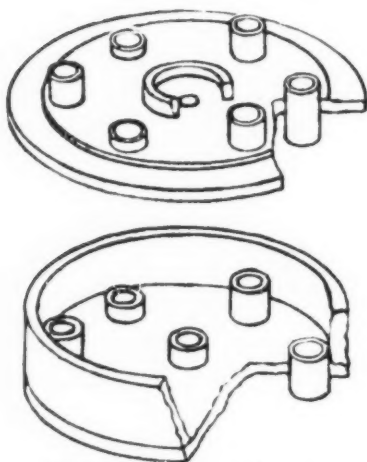


Fig. 9. Gear box and cover.

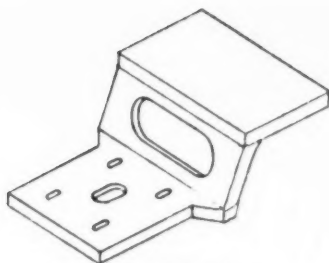


Fig. 10. Motor base.

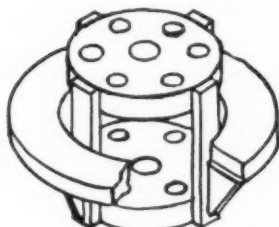


Fig. 11. Spindle housing.

ends and left the tool knockout holes in the center, clear. These housings were fabricated out of mild steel stock and welded into an assembly.

The four column head spacers were made out of steel pipe flanges and pipe welded together.

An estimated saving in the over-all cost of the machine in regard to casting versus welded fabrication were:



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CASTING

Pattern Cost\$1500.00
Casting Cost 1080.00
Additional Machining Cost .. 500.00
Time delay in production cost 5850.00

\$8930.00

The reason I put "delay cost" in this analysis is because we were machining these castings, one operation at a time, at a cost of \$2.00 each and if we had waited the necessary month and a half for patterns and castings, we would have paid out an additional \$5850.00

WELDING

Fabricating Labor\$1200.00
Steel Cost 400.00

\$1600.00

\$8930.00

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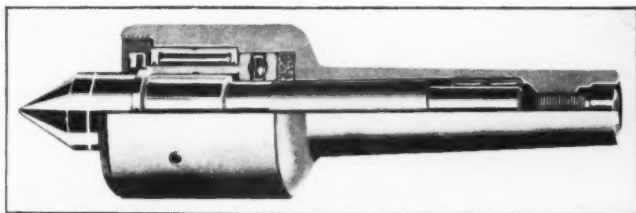
in labor which we saved by getting this machine into production a month and a half sooner. This paper won an award in the annual James F. Lincoln Arc Welding Foundation Contest. **THE END**

End Mills. In 3-flute, bottom cutting end mills, the combination of first and second back offs provides stronger, keener, longer-lived cutting edges. 12 pages discuss 3-flute end mills, gives interesting data on end mill care and correction of trouble. Photos, drawings. **Melin Tool Co., Dept. BB., 3370 W. 140th St., Cleveland, Ohio.**

Tube Fittings. Principal feature of these fittings is an alloy spring steel sleeve which holds excessive pressure beyond capacity at which tube ruptures. 12 pages of constructional details, drawings, photos, specifications. **Flodar Corp., 331 Frankfort Ave., Dept. BB., Cleveland, Ohio.**

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Precision-Built with many exclusive features that will give you extra long life with outstanding production performance and greater economy . . . Morse Taper Shanks stocked . . . Other shanks and tapers available for prompt delivery. Built with Bull Nose Heads, male or female, if desired.

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143



MOTO-TOOL

SAVES TIME — CUTS COSTS

Because Moto-Tool is small it is easy to handle. It can save you hours by speeding up work now being tediously done by hand. Use Moto-Tool for light finishing operations, touching up dies (without tearing down "set-ups"), sharpening tools, etc. Moto-Tool proved itself during the war in plants as G.E., Westinghouse, Ford and others . . . also used by the Armed Forces. Has sturdy, shockproof bakelite housing with "pencil-type" finger grip • Instant-action, wrenchless chuck • dust-filtered air-cooling system • Oil-less (sealed) bearing • Over-size armature shaft, hardened, ground and polished • 110 V., universal type (A.C.-D.C.) motor • Weighs only 13 oz • Dynamically balanced for vibrationless operation.

MOTO-TOOL KIT No. 2

WITH 23 ACCESSORIES

\$23.50



Approx.
27,000
R.P.M.

Moto-Tool No. 2

WITH EMERY POINT

\$16.50

Moto-Tool Kit No. 2, with 23 accessories (high speed steel cutters, grinding wheels, polishing accessories) and heavy-duty Model 2 Moto-Tool in natural finish, hardwood case . . . \$23.50. (Items purchased separately would cost about \$30.00; you save \$6.50).

Moto-Tool No. 2, with one emery point . . . \$16.50.

See Your Mill Supply Dealer

If he does not handle Moto-Tool, write the factory

DREMEL MFG. CO., Dept. T219-D • Racine, Wis.

WESTINGHOUSE FORUM IN APRIL

The 1949 Westinghouse Machine Tool Electrification Forum will be held in Buffalo, N. Y., on April 26th and 27th. The first day's session will convene in the Niagara Room of the Hotel Statler; the second day's session at the Buffalo plant of Westinghouse.

L. A. Liefer of the Gisholt Machine Co., Madison, Wis., will open the discussion with a paper on an "Automatic Piston Ring Machine." He will be followed by LeRoy Morrill of the Heald Machine Co., Worcester, Mass., with a paper on "High-Frequency for Machine Tools."

George Levesque, Brown & Sharpe Manufacturing Co., Providence, R. I., will present a paper on "Bonded Resistance Wire Strain Gauges as Components of Machinery and Gauge Equipment."

Following a recess, Mr. Alcorn of the Chambersburg Engineering Co., Chambersburg, Pa. and D. G. Hatchard of Westinghouse, will conclude the morning session with a paper on "R-F Heating of V-Ways."

Following luncheon in the Fillmore Room of the Hotel Statler, an open forum discussion will be led by D. W. McGill, Westinghouse, R. H. Clark, Warner & Swasey Co., Cleveland, Ohio, E. J. Rivoira, Cincinnati Milling Machine Co., Cincinnati, O., John Doran, of G. A. Gray Co., Cincinnati, Ohio, will assist in the discussion.

A report of the N.M.T.B.A. Electrical Committee will be given by its chairman, W. B. Wigton, Cincinnati Planer Co., Cincinnati, Ohio.

The second day's session will be held at the Westinghouse Buffalo Works, with transportation provided to and from the hotel. L. R. Ludwig, Manager of the Westinghouse Buffalo Divisions will welcome the guests. He will be followed by E. H. Vedder, of Westinghouse, who will demonstrate the Adjustable Voltage AV Drive. D. E. Herr, Westinghouse Transformer Division, will present a paper on "Machine Tool Control Transformer." "Electrical Braking for Induction Motors" will be presented as a paper by L. W. Herchenroeder, of the West-

You Can Grind • File • Polish • Burr

EASIER — FASTER — BETTER

With These Sturdy Dumore Tools

You don't have to "baby" Dumore Flexible-shaft tools. They're rugged, powerful, dependable tools that do a job for you shift after shift, day after day. And that holds good whether they work on tough continuous-duty production jobs, or on delicate and exacting toolroom operations.

3 Types to Choose From

Choose the Dumore that fits each of your particular jobs. You have a range of speeds, capacities, power, and control to cover every requirement for high-speed work. And each of the three gives you the same important basic operating advantages.

- A strong, durable shaft — with high flexibility for easy maneuvering.
- Light, sensitive, cool-running handpieces for easy work and close-control.
- Powerful, vibration-free Dumore motors built for long, trouble-free service.

Cost-Cutting Versatility

Put these cost-cutting Dumore tools to work in your shop. Use them on all off-hand operations. Build low-cost automatic set-ups around one or more — They make dependable, efficient workheads.

Choice of 2 Handpieces

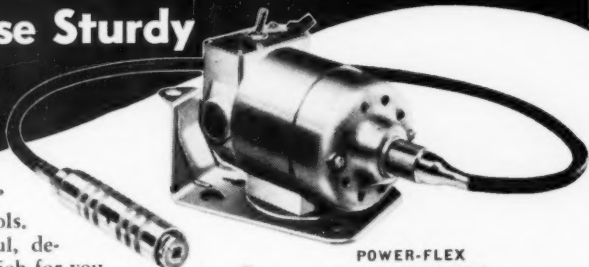


No. 2-203: Ball bearings; 0-1/4" geared chuck. (Standard with Uni-Flex and Duo-Flex. Can also be used on Power-Flex).

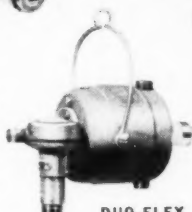
No. 2-204: Ball bearings; 1/4" capacity chuck with 1/4" collet. (Standard with Power-Flex).

Foot Rheostats

To give you speed variation or to leave both hands free — rugged foot-control rheostats are available for all these machines.



POWER-FLEX
1/4 H.P. 20,000 RPM
\$69.50



DUO-FLEX
1/15 H.P. 500-3500
(Gear Shaft)
3000-15,000 RPM
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\$52.60



UNI-FLEX
1/15 H.P.
15,000 RPM
\$44.75

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264

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The Dumore Co., Dept. D-27, Racine, Wisconsin
Please send me **FREE** Flexible-shaft Bulletin 264

Name.....Position.....

Company.....

Company Address.....

City.....(.....) State.....

G-20

inghouse Industry Engineering Department. The morning session will conclude with a paper on "Adjustable Speed Saturable Reactor Drive," by J. E. Priest, Westinghouse Motor Division.

After luncheon an inspection of the plant will be made, followed by an open discussion of the trip.

The forum will conclude with a dinner in the Ball Room of the Hotel Statler, at which Tell Berna, General Manager N.M.T.B.A., will speak.

BROACH ENGINEERING COMPANY ESTABLISHED

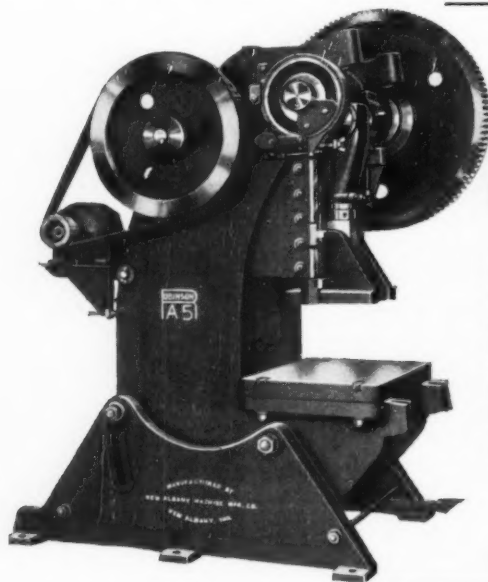
Broach Engineering Company, 525 N. Noble St., Chicago 22, Ill. announces its entrance into the broach manufacturing field. The firm offers a complete broach engineering service, together with the manufacture of all types and sizes of broaches and broaching fixtures. To firms without broaching facilities, the new company offers production broaching service. The Broach Engineering Co. will also maintain a twenty-four hour, broach sharpening service.

TERRY MACHINERY CO. ESTABLISHED IN CLEVELAND

With a record of eleven years as sales engineer for the Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, C. R. Terry has now organized the Terry Machinery Co., at 808 Hanna Building, Cleveland. The new organization is a sales agency for machine tools and general metal working equipment.

For the past six years as manager of HPM's Cleveland and Pittsburgh offices, Mr. Terry has a wide acquaintance throughout industry in this area. Prior to his service to the HPM company, he was buyer of machinery for the B. F. Goodrich Co., Akron, Ohio. He and his associates will represent a limited number of machine tool and metal working equipment manufacturers throughout northeastern Ohio.

During the early years of the recent war, while on leave of absence from his company, Mr. Terry organized the Ohio O.P.M. offices (forerunner of W.P.B.), serving as Cleveland manager and state director.



INCLINABLE PUNCH PRESSES SERIES A

ROBINSON

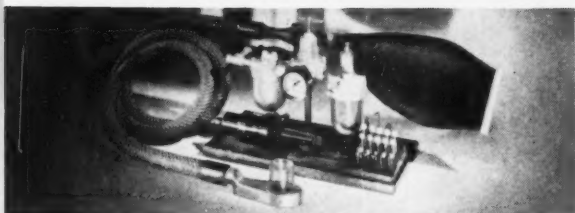
A-5 Motor Drive 88 Ton Geared Inclined Punch Press with Anti-Backlash Brake to take care of kick back when using air cushion and heavy spring pressure pads. Timken bearings in clutch wheel and back shaft bearings. Available in 14, 22, 32, 56 and 88 ton capacity. Literature on request.

**New Albany Machine
Mfg. Co.**

New Albany,

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COMPLETE SYSTEM INCLUDES DUST ELIMINATION



JIG GRINDING

with the
Vulcanaire

WHEN Jig Grinding is required you can have it quickly and economically with the Vulcanaire. Place in the spindle of your Jig Borer (or Mill).

AND YOU CAN . . . locate—finish grind holes in hardened steel to "tenths" at controlled speeds up to 65,000 R.P.M. . . grind dowel holes—square with a ground base . . . move location of holes in hardened steel blocks . . . grind interchangeable holes in hardened sections . . . grind .032 to $\frac{1}{8}$ " holes with diamond impregnated laps . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . grind contours in gages . . . jig grind large and awkwardly shaped components . . . eliminate jig bushings in tools where close spacing is essential.

RESULTS! Jig ground requirements are being designed into tools by the most enlightened engineering departments . . . Jig ground the hardened die, stripper plate, and die holder all fit together . . . uniform clearance means longer runs.

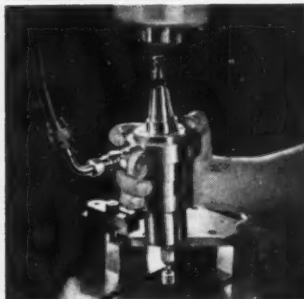
ADVANTAGES! the investment is less than for many Jig Boring accessories such as a rotary table . . . the Vulcanaire can be put on and taken from the machine in a few seconds . . . the Vulcanaire is completely portable (all accessories are platform mounted) . . . the system can be used between several machines of various capacities . . . employing both

the 10,000 and 20,000 series, components with various sized holes from the very smallest to 4" in diameter can be Jig Ground . . . the average Jig Borer operator becomes proficient at Jig Grinding after very little experience.

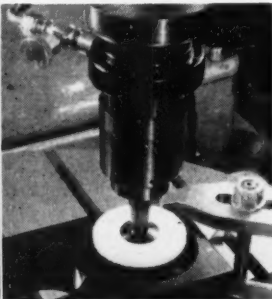
TOPS IN PRECISION . . . the Vulcanaire is precision built throughout and is constructed of alloy and tool steel. Super precision bearings, preloaded with our special fixtures are used, with all traces of radial and end clearances removed, resulting in Vulcanaire Jig Grinding to "tenths" . . . for quotation and literature please mention machine tool application.

VULCAN TOOL CO.

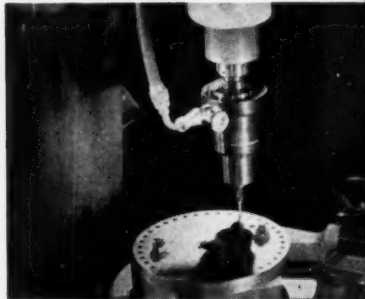
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10,000 SER. $\frac{1}{16}$ "- $1\frac{1}{4}$ " HOLES
PUT ON TAKE OFF EASILY



20,000 SER. $1\frac{1}{2}$ "-4" HOLES
ADAPTORS INTERCHANGEABLE



FOR JIG BORERS OR MILLS

*Substitute 1 Machine
for 3 or 4!*

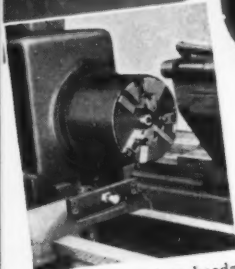
The
Motch & Merryweather
"DE" TRANSFER MACHINE
(Double-End)



1 SAWS STANDARD
STOCK TO
ACCURATE LENGTHS

2

(1) Chamfers both ends. (2) Center drills both ends. (3) Center drills and chamfers both ends. (4) Threads both ends (to a reasonable length). (5) Trepanns one or both ends. (6) Turns one or both ends (box tool). (7) Chamfers O.D. and I.D. of tubing. (8) Reams one end or both ends of tubing. (9) Chamfers O. D. and reams both ends of tubing.



Rugged secondary heads with simple gear reduction to husky spindle. Positioning slide adjusted quickly by rack and pinion. Hydraulic feeds and variable speeds.

MORE THAN A NEW MACHINE — ACTUALLY A NEW METHOD

The Motch and Merryweather "DE" (double end) Transfer Machine has no equivalent. Standard bar stock is automatically fed, cut off with a square *milled finish*, to accurate lengths of $\pm .004$ "; then automatically transferred to equalizing, self-centering jaws for accurate double-end machining. You save at least one operator; save several handlings; save overhead and floor space; save tooling. Husky construction makes for trouble-free service and long, profitable life.

Get the facts about this remarkable new but thoroughly proven machine



Only
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CIRCULAR SAW
SAW BLADE
BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING
CLEVELAND 13, OHIO

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

Letter from England



Written for the **MACHINE** and **TOOL BLUE BOOK** by Robert Hutcheson, Editor of **MACHINE SHOP MAGAZINE**, London, England.



Although the output of steel is keeping up, we in Britain, like you in the United States, just can't get enough of it. A new drive is being made for economy in the use of steel and the Ministry of Works and the Ministry of Supply have started a country-wide campaign for economy in the use of steel. One proposal is that safety standards should be lowered for structural steel work; it is claimed that this can be done without any real loss of safety. Another form of economy advocated is the use of welding in place of rivets and bolts for structural steel work, railway work, and boiler making. It is claimed that up to about 25 per cent. steel economies can be made in this way. A Professional Institutions Committee has been formed to consider improved methods of steel utilisation.

In a month's time the Institute of Welding are holding a conference lasting several days to publicise and consider ways in which welding in all manner of structures can cut down the use of steel.

Industrial concerns in this country undertake to limit dividends for a period and now the Federation of British Industries have been canvassing opinions from those concerns on the question of whether limitation of dividends should continue. Many firms are prepared to co-operate but there is every indication of reluctance to give an unqualified acceptance of the principle that there should be no increase in divi-

dends. The reply of the Westinghouse Brake and Signal Co. Ltd. shows that they will pay the same dividend for the current year but they are urging the Federation and other bodies to unite and urge the Chancellor of the Exchequer to give a drastic reconsideration of the present methods of taxation. Another firm, in their reply, say that they are not prepared to undertake not to increase their dividends in twelve months' time but they see no reason to suppose that circumstances will prompt them to want to do so. They also indicate that they feel the Chancellor of the Exchequer should show in his next budget that he has a real grip on the problems facing industry by elimination of profits tax on retained profits or a substantial increase in depreciation allowances; their feeling is, evidently, that if the Chancellor will co-operate with industry, they will be willing to help meet his wishes.

We continue with our little spates of labour unrest which seem to rise and fall. I reported in my last letter that a strike had occurred at the de Havilland Aero Engine Works owing to an operator refusing to work whilst being time studied. Sixteen hundred employees eventually came out on strike but they are now back at work and negotiations have been started.

On the other side of the picture we have the Daimler Motor Car Co. in Coventry issuing redundancy notices to three hundred of their employees. The rea-

son for this is given as limitations of supplies of materials for building cars for the home market and difficulty in finding export markets which enable them to maintain their export quota as set by the Government. The Daimler car is one of the high grade vehicles and its basic price at home is about £1,000 (\$4,000) but on top of this the purchase tax which is added places the few cars that are available out of the reach of the bulk of would-be motor car owners.

Other firms in the Coventry area (The Standard Motor Company and the Harry Ferguson Tractor Company), have also cut their staffs as a result of a cut in production because of shortage of sterling in markets abroad.


The Engineering Unions are again in the news on two accounts.

The Confederation of Shipbuilding and Engineering Unions have discussed new basic rate for craftsmen should be £6. (\$24) a week, and for skilled workers and labourers the weekly basic rate should be respectively, £5. 12s. (\$20.50) and £4. 12s. (\$18.50). a slightly higher rate would be

paid to workers in the London area and in the larger provincial towns. The Confederation comprises thirty-seven affiliated unions and the representatives of all these bodies are reporting back to their executives.

The employment of displaced persons from Europe is received in many quarters with mixed feelings and the Amalgamated Engineering Union has been assured by the Minister of Labour that Poles would not be employed unless suitable British labour was unobtainable and he assured the Union that the same wages and conditions of work should apply.

Seven thousand British manufacturers constitute the National Union of Manufacturers under the leadership of Sir Patrick Hannon, who is the Conservative Member of Parliament for one of the Birmingham districts. They are now launching a campaign for private enterprise. They wish to prevent any further nationalisation of British industry and obtain maintenance and expansion of free enterprise. Meetings are going to be held in the principal towns, leaflets and poster publicity will be embarked upon and workshop talks will



You're a Production Winner

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Drill-Jig Bushings and Gages

Yes, they're in stock, ready to go out to you — all A. S. A. standard types and sizes. You can also get fast service on new gages or gages salvaged by hard chromium plating . . . precision-finished, durable. Write for bulletin and price list.

Economy

TOOL & MACHINE CO.

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be given by members of Parliament and industrialists to demonstrate that the family welfare of the worker depends upon free enterprise. The Union also wants to form a body which is able to bargain collectively with the government on behalf of manufacturers.

During the war, and for some considerable time after the war, fountain pens had a very high scarcity value, but gradually most of the cheaper makes came back on the market and the position with regard to better-class pens is easing. Mr. A. Andrews, Chairman and Managing Director of the Mentmore Manufacturing Company, a firm manufacturing fountain pens, has quoted some figures. The Company's present rate of output is six and a half million fountain pens per year and this is said to be incapable of meeting demands. During the past year about fifty per cent of the firm's output has been exported and during the three months' period May to July 1948, the number of pens exported by this Company equalled eighty one per cent of the total number of pens exported with-

in their own price range.

An annual prize, the James Clayton Award, is given each year by the Institution of Mechanical Engineers to the engineer considered by the Council to have made the greatest contribution during the year to the science of engineering. This year's prize, which is valued at £1,350 (\$5,400) has been awarded to Mr. Karl Baumann, who is the chief mechanical engineer and a director of the Metropolitan-Vickers Electrical Company.

London is to have purer drinking water. The Metropolitan Water Board have reported that the latest method of super-chlorination has brought about improvement in the bacterial quality of the water and, what may be more important, the chlorine taste seems to have been reduced to the state where complaints about the taste are no longer received. It is estimated that there will be a decrease in running costs on water purification to the extent of £10,000 (\$40,000) per annum in the supply of water to the city; however, it is very

LOWN SLIP ROLL FORMING MACHINES

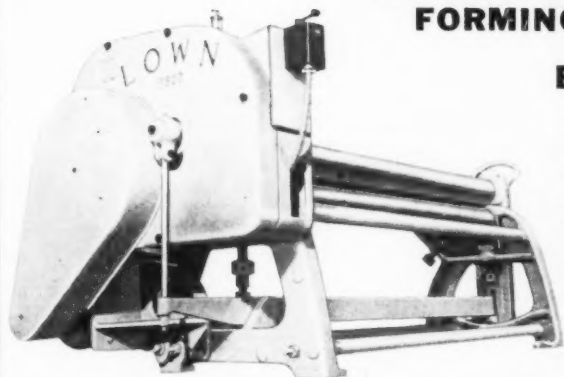
B-600 SERIES

A new, improved, modern design, heavy duty machine, engineered for durability, strength and service.

SELECT THE BEST . . .
LOWN Slip Roll Forming Machines are versatile . . .
dependable . . . easy to operate.

Write for bulletins!

LOWN Slip Roll Forming Machines are built in a range of sizes from which you can choose the exact unit for your requirements.



Model B-600 Series—6" diameter

SAN ANGELO FOUNDRY & MACHINE COMPANY

SAN ANGELO, TEXAS

1000 EAST UPTON

Distributors in Most Principal Cities

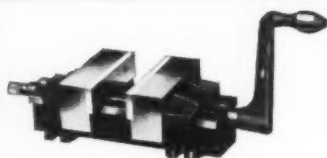
doubtful whether this saving can be passed on to the consumer by a reduction in the water rate as it would amount to but very little per head of London's population.

The big wave that is beginning to flow through British industry is the export drive to Canada. Mr. E. H. Gilpin, of Baker Perkins Ltd., and chairman of the British Food Machinery Manufacturers Association, headed a mission to Canada to investigate the possibilities of selling British machinery in that country. The report of the commission has been published and it is thought that there is a market if British manufacturers can manage to secure it. The Government is prepared to give priority for materials to firms that export to Canada as it is felt essential that our exports must be increased if Canada is to supply us with much-needed food and other commodities. During 1948, according to Mr. Wilson, President of the Board of Trade, Britain exported machinery to the value of £254,000,000 (\$1,016,000,000) and of this amount only £5,000,000 (\$20,000,000) worth went to Canada. Mr. Gilpin ad-

dressed recently a luncheon meeting of the Gauge and Tool Makers' Association and outlined the salient points of what is now known as the Gilpin Report. He emphasized the need for market surveys, adequate information concerning our products, the employment of competent representatives in Canada, early delivery and facilities for efficient servicing.

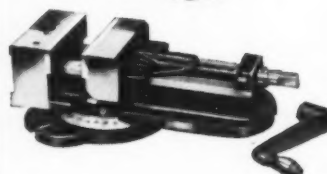
Socket Screw Price Lists. Two 12-page booklets cover complete line of hex socket screws including cap screws, set screws, shoulder screws, and pipe plugs and keys. Illustrated. **The Bristol Co., Mill Supply Div., Waterbury 91, Conn.**

Saw Filers and Grinders. In a combination cross-cut and rip circular saw filer, cross-cut saws are automatically swiveled and each tooth, as it comes, is given a true bevel. Booklet describes saw grinders, saw stretchers, band saw setters, and others. Photos. **The Wardwell Mfg. Co., 3167 Fulton Rd., Dept. BB., Cleveland, Ohio.**



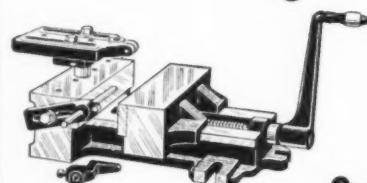
NEW GRAHAM CENTERING VISE

With left and right hand screw, both jaws move toward center, centering work regardless of size variations. This gives double-fast action. Can be used with interchangeable V jaws. Handle fits either end.



MULTI-PURPOSE SWIVEL BASE VISE

Has exclusive **ADJUSTABLE ZERO POINTER** to assure coincidence with zero on base. Complete 360° rotation. Positive 2-point lock in any position. Screw never protrudes under work, cannot be drilled into. Usable with special jaws and jig attachments described below. Removable from base for use plain.



JIG ATTACHMENT VISE

Usable plain. Also drilled and tapped for stops, guides, bushing plates and other attachments making it a Multi-purpose jig or fixture serving many repeat-operation needs saving the cost of making special devices.

ALSO "ADJUSTANGLE"-KNURL TOOL FITTING TURRET

Request Illustrated Price Bulletin 44

Graham Mfg. Co. 56 Bridge St.
East Greenwich, R. I.

Special CARBIDE TOOL GRINDER

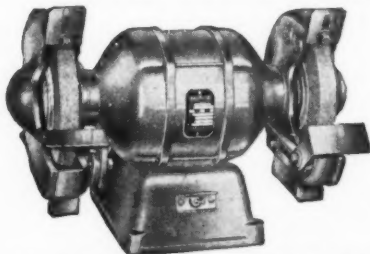


FOR QUICKLY AND ACCURATELY SHARPENING CARBIDE TOOLS

BALDOR GRINDER, series 500, (shown above) is the newest development in grinders designed and fully equipped for sharpening Carbide Tools quickly and accurately; has sturdy $\frac{1}{2}$ H.P., reversible, ball-bearing motor. 6" Silicon Carbide wheels; adjustable tool-rest tables, water pot. Complete as illustrated and GUARANTEED 2 YEARS against burn-out. **Price \$127.50**

Immediate Shipment

ASK FOR BALDOR BULLETIN 321C ON COMPLETE LINE



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District Offices in Principal Cities

AT LEFT: BALDOR Bench Grinder No. 8100 series. Has powerful $\frac{1}{2}$ h.p., ball-bearing motor, 60 cycle, 1700 r.p.m., 8" x 1" first-grade wheels. Heavy shaft, $\frac{3}{4}$ " arbor.

\$74.00

BALDOR
BALL BEARING **GRINDERS**



PENNY-PINCHERS

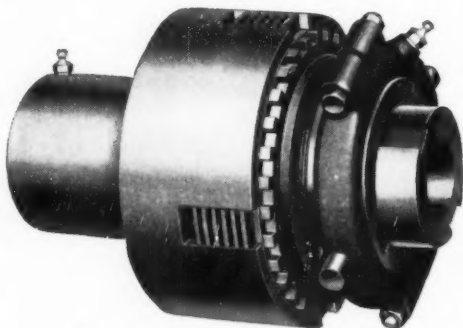
ON POWER COSTS

CONWAY CLUTCHES

MAKING one dollar's worth of power do what formerly cost two dollars is one function of these remarkable clutches . . . and getting the greatest efficiency from every penny is another factor in favor of

CONWAY CLUTCHES

"The Last Word in Friction Clutches" because of the wide flexibility of the many models and the ability to progress with the changing industrial scene.



Model ZL805 6-plate sleeve clutch

Basic Materials
Interchangeable, standardized
parts
Basic designs and engineering

Larger clutches in many sizes
Quick deliveries on catalog models
1/3 hp to 300 hp; 10 to 2300 rpm

WRITE FOR BULLETINS

THE CONWAY CLUTCH co.
2745 Colerain Ave. Cininnati 25, Ohio

Shop Hints

DIE HOLDER FOR MAKING SMALL STUDS

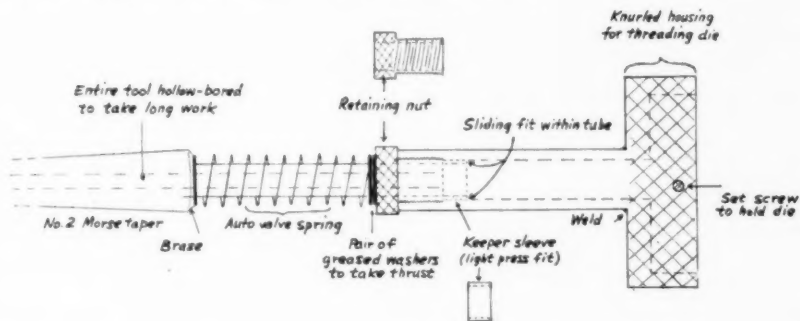
by Geo. F. Burnley

In the average repair and maintenance shop where special production tools are not generally found, occasion often arises where many small studs must be made in a short time. Since this task at the bench is especially tedious and sometimes inaccurate it may be readily be turned into a machine-powered job with time saving features by constructing the simple die holder shown here.

As indicated, the device consists of a pair of telescoping hollow shafts. The section having the Morse taper is made of a cast off drill press boring bar and is intended to fit in the tail stock of an ordinary engine lathe. It is bored hollow to allow the passage of studs requiring extra long threads and fitted, as shown, with a substantial compression spring to provide a constant, even, pressure against the die-head. At the

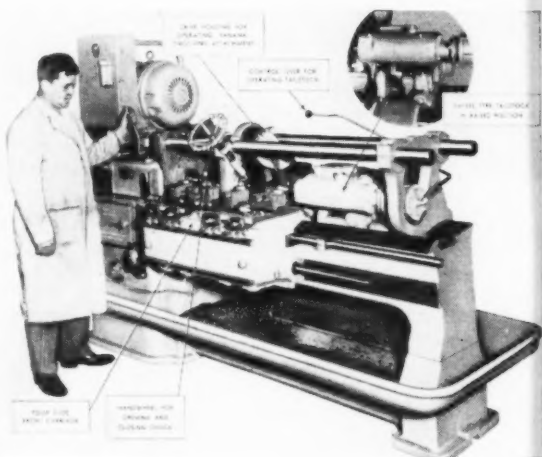
front, the free turning hollow shaft or tube is fitted with a knurled cup-like hand grip which houses the threading die. Here, of course, adapting sleeves may be made to hold various die sizes though only one or two should be necessary as the capacity of the tool for practical operation does not generally exceed 5/16".

In using this device, it has been found best to feed long bars through the lathe chuck, providing the machine has a hollow spindle, and bring the tail stock up so that the spring of the tool is slightly compressed while the hand acts to control the sliding or braking action of the die holder to cut the threads to the best advantage. Finally, of course, the die is spun off while the stud is sawed off at the chuck jaws.



LATHE AUTOMATICALLY TURNS CAM SHAFTS IN SINGLE OPERATION

The Lo-swing Auto-matic Lathe illustrated above turns and chamfers all bearings, oil pump gears and cuts interrupted oil or "banana" grooves in a single operation. This Center Drive Lathe is equipped with a special two-jaw scroll chuck which clamps and drives the shaft from the cam located adjacent to number three bearing. The chuck jaws are opened and closed with a permanently mounted, gear type, hand wheel shaft. The air operated, swivel type tailstock is operated with two air cylinders, one of which swings the hinged upper section vertically, to permit easy loading and unloading in a line parallel with the centers, thus eliminating all overhang of the tailstock center. The second air cylinder controls the movement of the spindle quill. Both movements are controlled by a four-way control valve.



is mounted—with other squaring tools—in a block on the rear of the slide. The driving head swivels on the chuck drive housing and follows the "feed in" and "feed out" movements of the rear slide. The "banana" grooves are always cut in definite relation to the chucked cam on the camshaft.

The machine cycle is as follows: the operator places the camshaft between centers, closes the chuck jaws and operates the spindle starting lever. The front carriage slides and tools advance

The "banana" grooving attachment is driven and timed from the main drive shaft and imparts a shuttle motion to the grooving tool slide, which

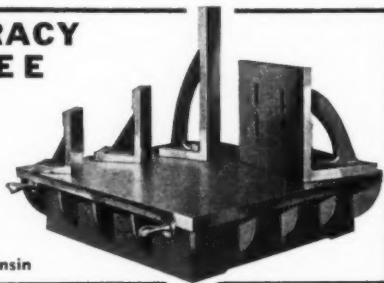
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in rapid traverse to the cutting position and then slow down for normal feed. The squaring, chamfering, and grooving tools, mounted on two automatic back squaring attachments, are timed to cut immediately after the front turning tools have ceased cutting. Immediately the rear tools have ceased cutting, all tools and slides are returned to the starting position in rapid traverse. All movements are automatically controlled; the operator simply loads and unloads the parts and operates the starting lever.

Production at 80% efficiency, is reported to be 80 cam shafts per hour. The Model "LR" Lo-swing Automatic Lathe is manufactured by the Seneca Falls Machine Co., Seneca Falls, New York.

Multiple Spindle Drilling Machines. 12 pages of photographs, constructional data, drawings and specifications on horizontal, vertical, as well as 3 way hydraulic multiple spindle drilling machines. Special purpose machines, also radial arm drilling and tapping machines. **The Baush Machine Tool Co., Dept. BB. Springfield Mass.**

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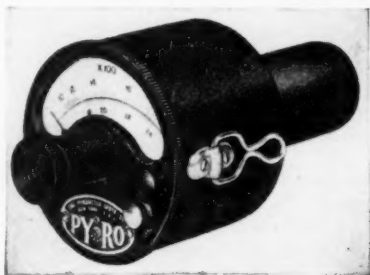
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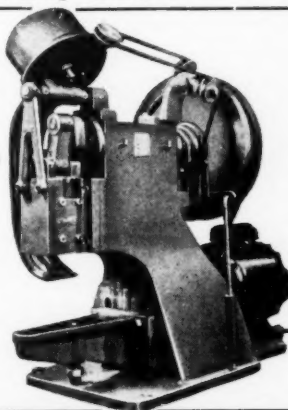
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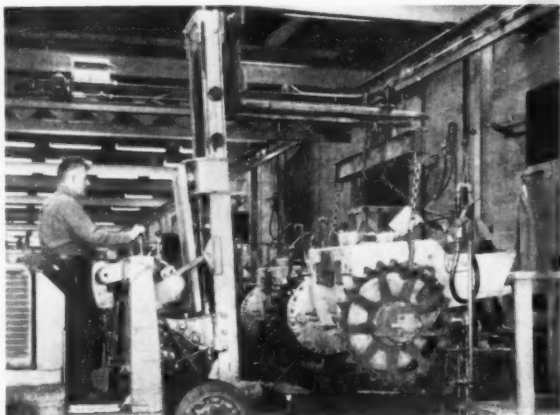


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third chain, centrally located, supports the nose of the mechanism and prevents it from swinging downward.

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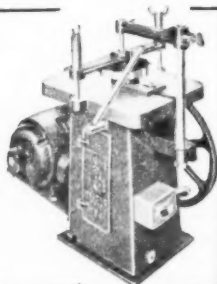
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Trolley Conveyors. 80 illustrations depict a great variety of actual installations and show the flexible adaptability of this type of conveyor. Photos show conveyors in warehouses, foundries, radio and television factories, and others. 28 pages, illustrated. **Link-Belt Co., 307 N. Michigan Ave., Dept. BB., Chicago 1, Ill.**

Silicone Fluids DC200 are notable for their heat stability, shear resistance, relatively constant viscosity over a wide temperature range, lubricity, water repellency and good dielectric properties. 30 pages cover chemical structure, applications, properties, physiological characteristics, chemical behavior, etc. **Dow Corning Corp., Dept. BB., Midland, Mich.**

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Hydraulic Cylinder Catalog, section No. 103 illustrates and describes all standard cylinders, with complete diagrams and information to aid in laying out circuits. Engineering data includes displacements and theoretical forces for cylinders in both standard and 2 to 1 rod. Construction features accent Keeper ring design to eliminate tie rods and permit covers to be rotated to convenient pipe locations. **Gerotor May Corp., Dept. BB., Baltimore 3, Md.**

Soldering Manual affords a complete analysis of the properties and application of soft solder alloys and soldering fluxes. Contents includes: applications, properties, types of fluxes, and lists complete line of products. Photos, drawings. Available from **Kester Solder Co., 4201 Wrightwood Ave., Dept. BB., Chicago 39, Ill.**

Cut-off Wheels. Three bulletins discuss rubber bonded abrasive cut-off wheels, resinoid bonded cut-off wheels, rubber bonded polishing wheels, and ball race grinding wheels. Data includes specifications and information on each type of wheel, including materials and operation on which they are used. **The Allison Co., Dept. BB., Bridgeport, Conn.**



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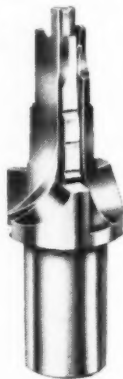
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Carbide Tools by Willey are described in 40 pages. Willey's Metal is manufactured in six grades for the metalworking industry. Listed in this catalog are standard turning tools, blanks, reamers, tips, drills, mills, broaches, saw blades, gage bushings, wire drawing dies, work support blades for centerless grinders, and others. Specifications, photos, prices. **Willey's Carbide Tool Co., 1340 W. Vernor Highway, Dept. BB., Detroit 1, Mich.**

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Metal Stitching illustrates the method of stitching metal and non-metallic materials which replaces rivets, screws, bolts and spot welding. Complete line of stitching machines, specifications. **Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.**

Worm Gear Speed Reducer. It is claimed that Speedaire saves 50% or more space; 30 to 40% weight. Bulletin presents case histories of typical installations, showing facts and figures of savings. 4 pages, illustrated. **The Cleveland Worm and Gear Co., Dept. B.B., 3249 E. 80th St., Cleveland, O.**

Lathe Catalog describes the complete South Bend line of 9", 10", 13", 14½", 16" and 16/24" swing precision quick change gear and toolroom lathes and ½" and 1" collet capacity turret lathe. Illustrations and specifications. Eight pages devoted to description of major lathe attachments and accessories. 64 pages. **South Bend Lathe Works, Dept. BB., South Bend, Ind.**

Industrial Precision Casting as well as jewelry casting assaying and refining, and specialty melting equipment is described in 60 pages. Supplies listed include: waxes, crucibles, machines, pumps, oven, melting furnaces, scales, rolling mills, tongs, etc. Photos, price list, specifications. **Alexander Saunders & Co., 95 Bedford St., New York 14, N. Y.**

Screw Machine Tools by Boyar-Schultz are listed in 24 pages. Drawings, photos, specifications, prices. Listed are burnishing, turning, knurling tools, reamer, drill holders, adapters. Replacement parts list and prices. **Boyar-Schultz Corp., 2110 Walnut St., Dept. BB., Chicago 12, Ill.**

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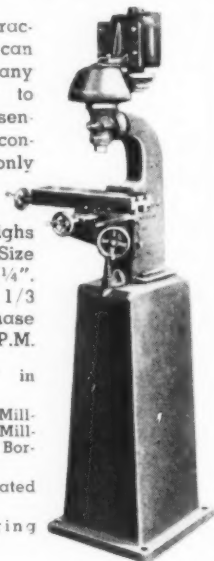
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Automatic Production Control discusses the function of automatic production control and the means of applying it to production machinery through use of variable speed transmission and Motodrive. Described in 12 pages are hydraulic automatic control, mechanical automatic control, and differential automatic control, as well as various speed indicating mechanisms. **Reeves Pulley Co., Dept. BB., Columbus, Ind.**

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Gar Wood Industries, Inc., Wayne, Michigan, is currently producing all five of its major hydraulic pump gear types on a single Michigan Shear-Speed, followed by shaving on a Michigan rotary gear finisher. This setup has the following advantages:

1. Sharply reduces cutting time (only 93 seconds for gear "E" against 18 minutes for hobbing).
2. Tooth spacing, so important and relatively difficult to maintain in pump gears, is automatically maintained by the multiple form tools of the Shear-Speed, even on the coarsest pitch gears having a minimum of overlap.
3. Distortion and difficulty in holding the work is eliminated since cutting pressures are completely balanced by cutting all teeth simultaneously, with radial feed.
4. Accuracy of tooth form is easily maintained since this depends primarily on the accuracy to which the form tools were ground initially.
5. Output per grind of tools is approximately doubled, reducing the number of tool changes during a given production run. Design of tools permits between 40 and 50 grinds, removing .015 each time.

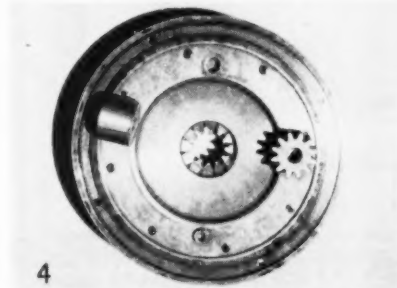
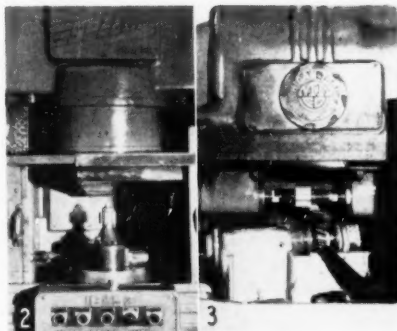
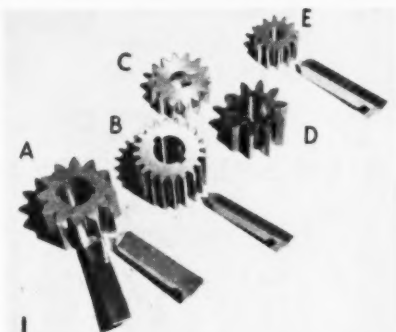
Fig. 1 shows the 5 types of pump gears (for specifications, see table below). Gear "A" is produced in two cuts, the roughing and finishing tools shown being interchangeable in the same cutter head. Gears "D" and "C" are also cut in two steps. However, two "C" gears are cut at one time with the blanks stacked one above the other. Metal removal on "C" and "D" is almost one-half of total blank weight.

Fig. 4 shows the cutter head, finished gear and blank for gear "E." The Shear-Speed is shown in Fig. 2, with one of the three gear shavers in Fig. 3.

Pump outputs range from 13½ to 52 gpm at 800 psi and 1000 rpm for these gears. Finished gears are so accurate that the 13½ gpm pump will actually deliver up to 17 gpm at 1000 psi and 1000 rpm.

Gear (See Fig. 1)	No. of Teeth	Out-side Dia.	Face Width	Dia-metral Pitch	Pressure Angle	Pump Use	No. of Operations
A	12	3.645	2¾	3.8052	35°	Road Mach.	2
B	20	3.487	2¾	6.342	20°	Road Mach.	1
C	14	3.192	1¼	5.000	22½°	Hoist	2*
D	10	3.195	2¼	3.8052	27½°	Loadpacker	2
E	12	2.332	1½	6.000	22½°	Hoist	1

*—Two gears cut at one time, however.



For Shear-Speed machine details, write Michigan Tool Company for Bulletin SS-48-2.

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15/64" x 12"	2.00
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17/64" x 12"	2.12
9/32" x 12"	2.12
19/64" x 12"	2.29
5/16" x 12"	2.29
21/64" x 12"	2.59
11/32" x 12"	2.59
23/64" x 12"	2.88
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Home of Lyon-Raymond Corp., in Greene, N. Y., is described in a neat little booklet of 32 pages. Management's policies with its fellow workers are also described. The line of materials handling equipment manufactured by this company is illustrated. **Lyon-Raymond Corp., Dept. BB., Greene N. Y.**

Jig Borer Cutting Tools include tables for boring holes from 1/16" to 5" in diameter in materials 1.8" to 4" thick within tolerances up to plus or minus .0002". Booklet contains illustrations and descriptions of all Moore jig borer accessories, including: eccentric boring chucks, boring bits, solid type boring bars with shank "micro"-setting bars with shank, drill chucks, etc. **Moore Special Tool Co., Inc., Dept. BB., Bridgeport, Conn.**

Rex Flat Spray Nozzles are featured in a new bulletin. Nozzles are shown in service where water or liquid chemicals are used in cleaning, cooling, washing, and de-scaling operations: Tabular information concerning discharge in gallons per minute, dimensions, materials, specifications, prices. **Chain Belt Co., 1600 W. Bruce St., Dept. BB., Milwaukee 4, Wis.**

Measuring Microscopes for Laboratory and Shop describes and illustrates micrometer microscopes, traveling microscopes, micrometer slide comparators, instruments for measuring creep, thermal expansion, etc. and many accessories and related equipment. Technical data on the selection and use of microscopes is included. **The Gaertner Scientific Corp., Dept. BB., 1201 Wrightwood Ave., Chicago 14, Ill.**

Ace Drill Catalog contains 2165 different items and considerable technical data that the user of drills will find helpful. Catalog conforms to all changes made by the A. S. A. this year. Technical section of catalog contains information on cutting fluids, crankshaft pointing, and pointing the drill. Tables of tap drill sizes, cutting speeds, and consecutive listing of regular drill sizes. 128 pages. **Ace Drill Corp., Dept. BB., Detroit, Mich.**

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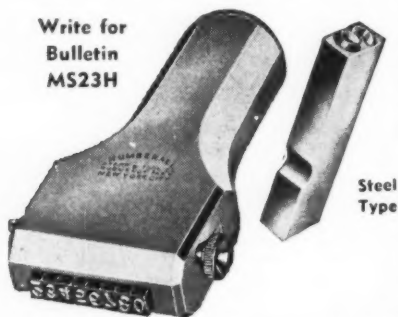


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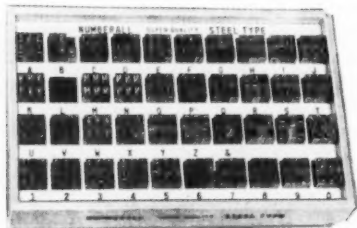
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METALLURGICAL MATERIALS AND PROCESSES

By John Elberfield, Dean of Engineering, Worcester Junior College
Published by Prentice-Hall, Inc.
New York. 1948. xiv plus 188 pages
\$5.00

This useful work is designed, to quote from the author's foreword, "to provide persons working or intending to work in industry with a general background in the science of metals." The book could well serve as a text in formal education, or for apprentice training courses, since it covers in a logical sequence the various properties and aspects of both ferrous and non-ferrous metals and alloys.

The book opens with a series of chapters on the refining of metals and the various mechanical properties of materials, with explanations of standard physical terms used in referring to ordinary aspects of metals (such as stress, strain, yield strength, malleability, ductility, and the like); a chapter is included describing the various fabrication methods used on metals, including types of molds; this is followed by an enlightening résumé on grain structure.

The equilibrium, or constitution diagram, of considerable assistance in the study and use of alloys is next taken up, with appropriate sketches illustrating the various compositions. The author cites arbitrarily five principal cases (aside from the variations and complications).

A revealing discussion of the heat treatment of steel follows, including the various phases encountered in the process (austenite, ferrite, and cementite). This is succeeded by chapters on ferrous

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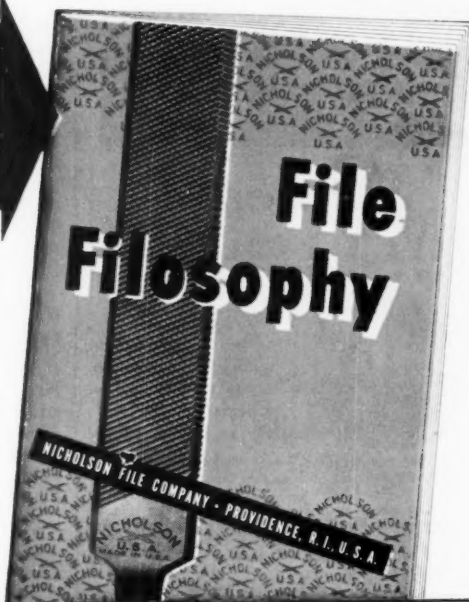
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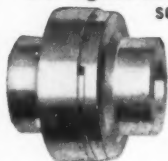
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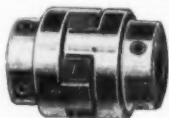


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and non-ferrous metals and alloys. The many phases of welding metallurgy, the cleaning and coating of metals, powder metallurgy, types of furnaces, with their characteristics and controls, are taken up in sequence.

The book is divided into fifteen chapters, with an extensive appendix containing necessary tables and a useful reference reading list of suggested outside aids to those wishing to follow up specific subjects in greater detail.

MACHINE DESIGN DRAWING ROOM PROBLEMS

By C. D. Albert, M. E., A.S.M.E. Professor of Machine Design, Emeritus, Cornell University; Academic Member of the American Gear Manufacturers' Association. Published by John Wiley & Sons, Inc., New York Fourth Edition. 519 pages. \$5.00.

This valuable work has had a wide demand ever since its author issued the first edition in 1923; its popularity is attested to by the fact that it has now run into four editions. The book is designed to include in a single volume all the information necessary for drawing room or laboratory courses in machine design. It contains ten chapters of reference material and sixteen chapters of a specifically practical nature.

The information included in the text under the various chapter headings for each problem, as well as the chapters on engineering materials, allowable stresses, screw threads and fastenings, and the accompanying tabular data, are of definite use to industrial designers.

Although the work is of a highly technical nature, it is written in concise, forthright English. The author stated in his original preface that the contents of the work are offered to design engineers with a presupposed knowledge of Kinematics, Mechanics and Engineering Drawing. The value of the book is enhanced not only by the formulae, but by the numerous clear drawings to illustrate the text.

After an introduction, the book takes

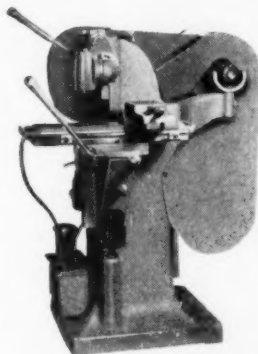
up in arbitrary sequence, chapters on the Flanged Shaft Coupling and Bearing Cap. Various aspects of gear transmissions shafts, presses and brakes follow. Discussions on static and fluctuating loads, straight and helical gears, worm gearing, and accompanying problems follow. An interesting chapter among the many revisions included in this new edition is that on tolerances and allowances for metal fits.

The usefulness of such an extensive work as this can hardly be underestimated, since its coverage of the various mechanical and kinematic problems which are met with in industrial design is so comprehensive. It is a work in which one finds it interesting to "browse", when not engaged in any particular field of research, since it contains such a wealth of information; it is almost encyclopedic in its scope.

Quality Stampings in Small Lots describes the facilities of the Federal Tool and Mfg. Co., 4-page folder stresses actual case histories of jobs they have run for clients. Short run stampings is one of their specialties. Federal Tool & Mfg. Co., 3600 Alabama Ave., Dept. BB., Minneapolis, Minn.

The Improvements of Metals by Forging describes in detail the types and characteristics of forgings, discusses design, other information of value to the specifier of forgings. Processes, heat treating, machining, inspecting is pictorially described. Tables give information on various forging metals. 44 pages. Photos. The Steel Improvement & Forge Co., Dept. BB., 970 East 64th St., Cleveland 14, O.

Centerless Grinding Information found in factual bulletin by Simonds Abrasive. Field reports show results in finishing and stock removal operations by centerless grinding. Suggestions for better operating efficiency and wheel recommendations for grinding on all types of metals are included. 8 pages. Simonds Abrasive Co., Dept. BB., Philadelphia, Pa.



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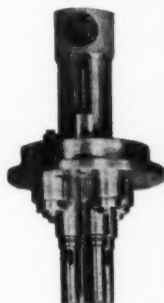
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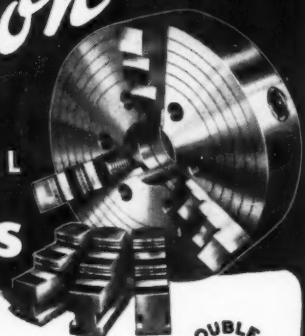
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THE STATE OF SMALL BUSINESS

The number of small businesses in the country today, per thousand of population, is as large as at any time in our history and numerically there is no downward trend in sight, according to A.D.H. Kaplan, economist, whose report, "Small Business: Its Place and Problems," is issued today by the Research and Policy Committee of the Committee for Economic Development. This does not rule out the probability that the next few

years will see weeding out among the small businesses that mushroomed in the wartime and postwar sellers' market.

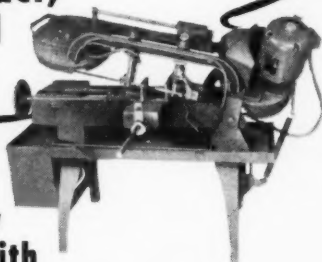
While small business has maintained its strength in numbers, it has lost some ground in the proportion of the nation's business. Three main factors will affect its future vitality, according to Kaplan: first and foremost, improved management; also greater availability of equity capital and an improved long range program of federal taxation.

In reviewing the present state of small business, Kaplan points to its importance for a healthy free enterprise economy and for our democratic society. In 1931 small business represented the source of 11 million jobs. If it is to contribute its future share to high productivity and employment, we should look to small business for 14 million jobs.

With productive and marketing demands increasing, Kaplan cites improvement of small business management as the most necessary step toward strengthening it. Business itself — both big and small — has responsibilities in this regard, he points out, and there are steps to be taken by the community and by business organizations. Action is needed particularly in these areas:

1. Colleges, especially schools of business administration, should lay less stress on students acquiring specialized skill for big business and should emphasize general instruction that will encourage

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their graduates to take the responsibilities and opportunities of small business management and ownership.

2. Trade associations should place more emphasis on making their members alert competitors and less emphasis on protective legislation. More attention needs to be given to organizing trade information so that it is directly usable by the small businesses in the trade. Trade publications, also, should go further in adapting the information they supply to the needs of small businesses.

3. Business organizations such as Chambers of Commerce should conduct con-

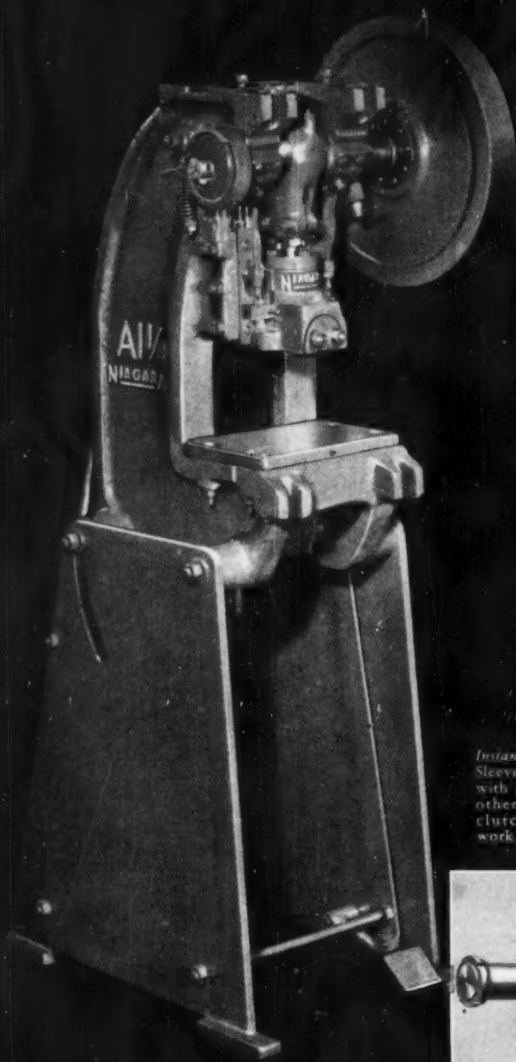
tinuing local educational programs for small business. They can help, for example, by sifting and recasting business information—such as that provided by the U. S. Department of Commerce—so that its relevance to local markets is apparent.

4. Manufacturers should aid their small business customers by supplying more helpful information about merchandising their products. A notable example is the work done by automobile manufacturers in schooling dealers. Manufacturers in a number of fields have developed useful means also for helping small customers gauge their financial position, work that needs continued attention from the banks as well.

Kaplan declares that fear of competition, often stemming from lack of knowledge, frequently has been allayed by seeking protection that takes the form of keeping someone out of a market.

He points out that there are few such walls that will not be got round by alert competition. The small business man will strengthen himself by learning how best to compete for, not how to restrict, markets. He urges that artificial trade barriers between states and other restraints on normal business be removed.

Commenting on the often-quoted small-business mortality figures, Kaplan says that they are misleading, in that many closings are mere changes of ownership, while other supposed "failures" represent a switch from self-employment to

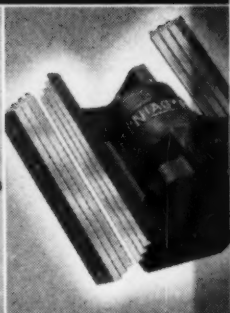
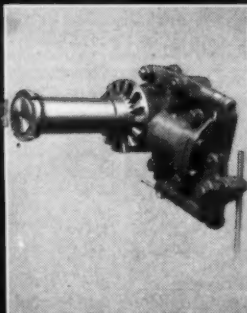


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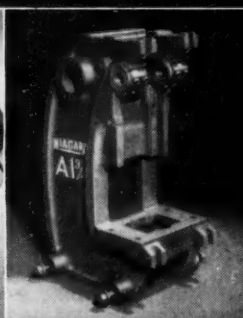
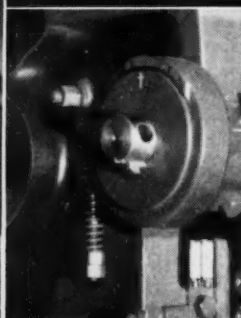
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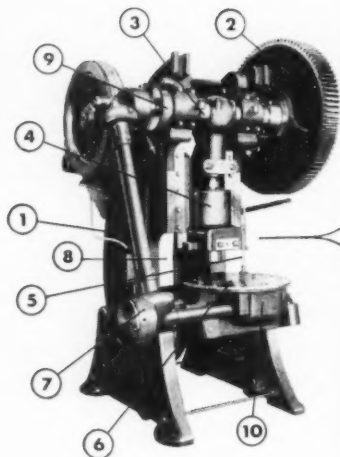
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employment by others, or mergers or voluntary retirement.

A lack of equity capital is one of the major handicaps to small business stability, according to the author. Commercial banks, the main source of small business loan capital, cannot enter into equity financing or even extended term financing. He believes a government lending agency to provide such capital is inadvisable in that it would tend to reduce the independence as well as the efficiency of small scale enterprise.

Capital banks under the Federal Re-

serve System are proposed as a possible method of supplying this equity financing. The British Industrial and Commercial Finance Corp. and others on the European continent are reported as having success in this field. Commercial banks could become stockholders in such banks along with individuals and groups seeking to expand the business of their communities, the author suggests.

Community funds for local business development can be helpful in some areas in providing equity capital, but the activity of such funds to date indicates that they cannot meet the broad needs of small business financing.

As to tax reforms that would aid small business, Kaplan says: "Analysis of business profits has made it clear that small business tends to experience a sharper drop in income when business is generally low and a sharper rise in profits when business activity is

high, than is the case with the more broadly based big enterprise. Hence small business has more than proportionate dependence on any characteristics of the tax system which tend to sustain the total of employment and the aggregate demand for goods and services."

Extension of the carry-forward of business losses from the prevailing two years to five years was recommended by Kaplan, a provision since incorporated in the Tax Revision Bill of 1948. The principle of averaging taxes over good and bad years, sound for all business, is

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often vital to the survival of small business.

"A system of averaging of individual incomes over a given period would serve, likewise, to eliminate present discrimination against persons whose incomes are irregular . . . a tax system that has as little repressive effect as possible upon investment in small business must be regarded as essential for the survival and growth of small business."

Kaplan concludes that a main deterrent to constructive action to aid small business is the fact that the problems of small business are too often made political issues, and even political hobby-horses.

He deplores the habit of talking about "big versus little" business. Not only are small businesses in many instances the suppliers as well as the customers of big business, but the development of large-scale manufacture has increased the opportunities for small businesses that are essential adjuncts to the big business.

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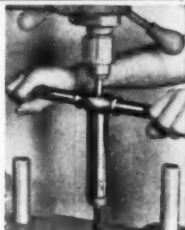
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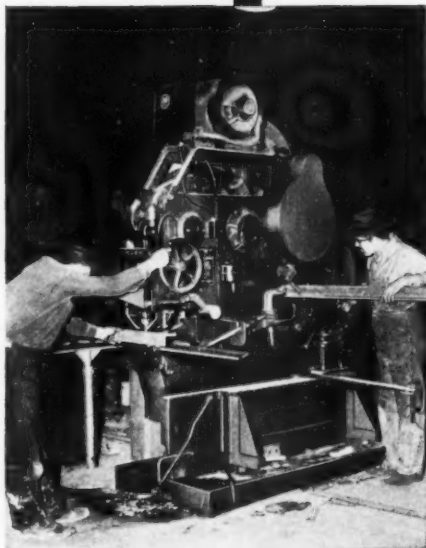
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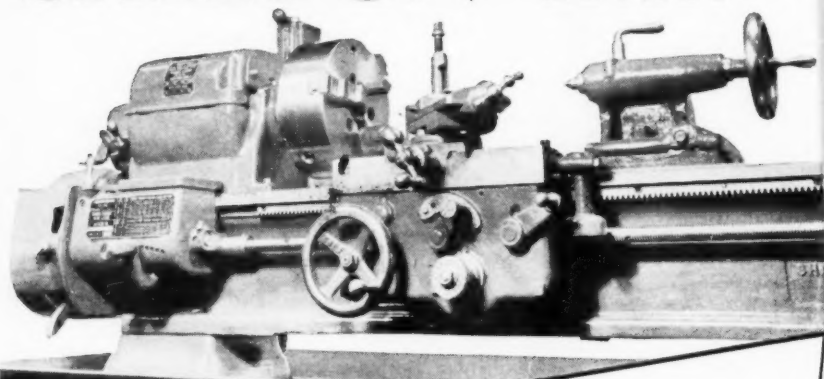
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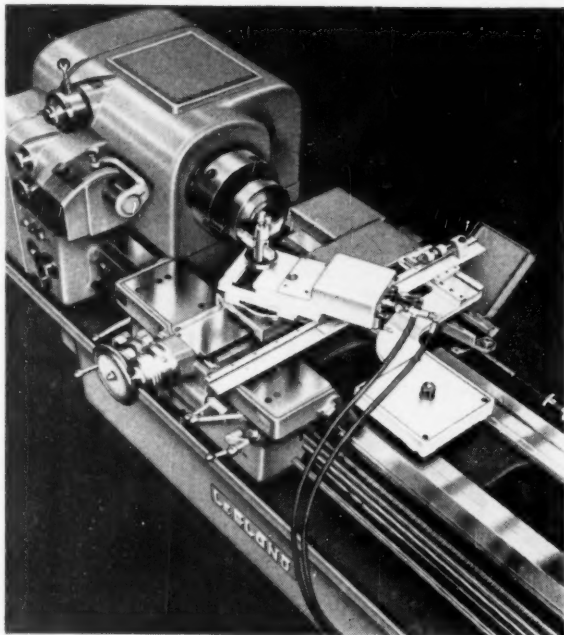
What's New in METALWORKING

NEW LEBLOND HYDRAULIC TRACER

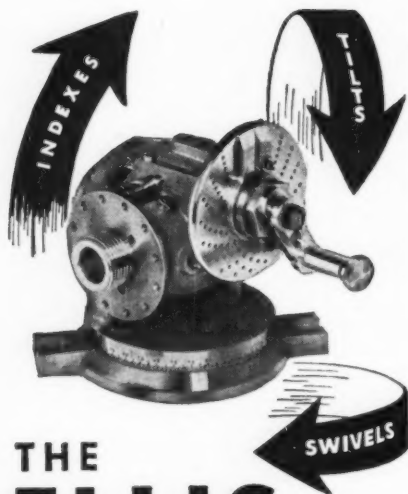
A new hydraulic attachment for shaft and profile contouring that can be installed without drilling or fitting on LeBlond heavy duty lathes in the field is announced by the R. K. LeBlond Machine Tool Co. Known as the "Hydra-Trace", this new device accommodates stock to the full swing capacity of the lathe, and does not interfere with cross slide travel or prevent the use of the taper attachment.

LeBlond officials state that the Hydra-Trace is available in six different sizes for use on LeBlond heavy duty engine, the RT series engine and tool room, plain and sliding bed gap, and Rapid Production Lathes.

Sold as an attachment, the Hydra-Trace may be added to new LeBlond lathes or to those in the field built since 1935. This is believed to be the first low cost contouring device ever made to the metalworking industry;



The LeBlond Hydra-Trace arranged for profile facing. Note how the bed bracket is designed so as not to interfere with the taper attachment.



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Many unique features make the ELLIS Dividing Head more than an ordinary indexing fixture. It is a precise, rugged unit with 6½" normal swing increased to 11" swing through the use of riser blocks. It TILTS more than 100 degrees in the vertical plane—SWIVELS 360 degrees in the horizontal plane—INDEXES by crank, or directly by hand. Work is held between centers, or in chucks or collets. The ELLIS Dividing Head is a universal work head that will increase the production versatility of your milling machines, grinders, drill presses and jig borers—write for complete details today.

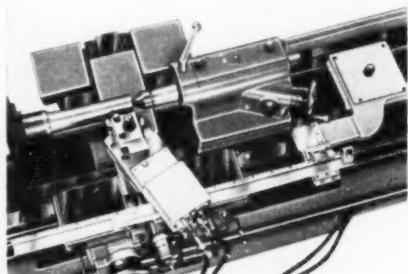


heretofore it has been necessary to buy complete contouring lathes.

An electric duplicating attachment was introduced last year for Regals and Dual Drives (light and medium duty lathes), so that now every LeBlond engine type lathe can be fitted with an automatic contouring device.

The Hydra-Trace is mounted on a special compound rest which is interchangeable with the regular compound rest in a matter of minutes. It is intended for both between-centers duplicating and for profile facing, (see illustration) and the shift from one to the other can be made easily and quickly.

Since no drilling or fitting is required, the Hydra-Trace may be used on several different types of LeBlond lathes of identical size.



The Hydra-Trace arranged for shaft duplicating. The illustration and the one on the first page of this article show the application on the new LeBlond 16" RT series.

• • •

Operating on the template-actuated stylus principle, the Hydra-Trace brings automatic stepless contouring to the standard lathe. It will perform the complete range of operation, including straight facing and turning, tapers of any kind, shoulders, necking, concave and convex surfaces, and spherical surfaces. A stylus control metering device is built directly into the compound rest. Diameters are adjustable by means of the lathe cross feed screw, and feeds are selected directly through the regular feed box.

The design of the Hydra-Trace is simple. Only five parts are required: tracer slide, template, template carrier, bed bracket, and hydraulic tank and pump. This simplicity permits easy mounting, unmounting and operating. Lathe operators grasp the principle quickly, and within a few minutes, can handle it like a veteran.

Template holder and all controls are located in front of the lathe, and there are no overhanging brackets or controls in the rear. The Hydra-Trace is mounted so that it does not interfere with use of the taper attachment. The tee-slot on the tracer slide will take any standard or four-way tool block, and the slide may be swiveled to suit the most favorable angle for tool clearance.

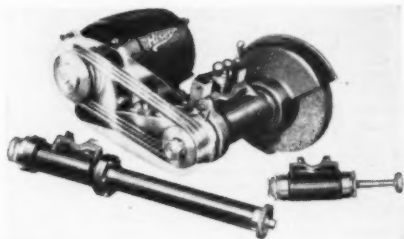
Some idea of the power and capacity of the Hydra-Trace may be gained by examining the 16" size. With 3" top slide travel shaft, diameters can be reduced from 4¼ to 6" by varying the angle setting of the tracer slide. On a standard 16" heavy duty engine lathe, shaft and profile facing jobs up to 20½" diameter can be accommodated.

For complete information on contouring devices for any LeBlond lathe, write for descriptive bulletins. Address

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The principal change is in the motor mounting. An adapter base for the motor is now supplied with a flat key and keyway between the adapter and the main frame casting. The motor is mounted on the adapter with the usual four screws, while only two screws clamp the adapter to the main frame. This permits minimum time in adjusting the V-belts when clamping from external to internal spindle head, or vice versa. The keyway assures accurate belt alignment at all times.

Other improvements have been made throughout the grinders, so that cylindrical, internal and surface grinding operations can be performed when these machines are mounted in lathes, boring mills, planers, milling machines, etc. They are especially applicable for tool room or production work.

For complete specifications, send for catalog sheets to:

The Hisey-Wolf Machine Co.
Dept. BB
Cincinnati 25, Ohio

NEW SUNDSTRAND CONTOUR MILLING MACHINE

A new cam-controlled contour milling machine is introduced by Sundstrand Machine Tool Co. It combines in one unit a vertical spindle milling head, a cam follower, a cam-carrying table and a rotary work table and is designed for milling irregular contours on work parts from master cams. The machine features a wide selection of automatic cycles (over 24 possible cycle combinations) for both internal and external milling of practically any contour on work parts up to 5" diameter. Their compact design permits line installation of a battery of these machines for convenient operation by one operator. The only duties are to unload, reload and start the automatic machine cycle. Another time-saving feature is the machine's ability to cut master cams from sample parts, thus eliminating the engineering of intricate cam profiles.

The machine has a $\frac{3}{4}$ h.p. milling head and a cam follower spindle,

NOTCHING TUBING OR PIPE ENDS EASILY WITH

ARC-FIT

Patent No. 2,126,519

IN POWER PRESS OR HAND PRESS

Arc-Fit is a notching unit for preparing pipe or tubing ends in making welded or brazed tubular joints. Arc-Fit will prepare the ends of a pipe or tube in less than 5 seconds. Arc-Fit is a production tool that will cut your production costs. It is applicable in any industry where pipe or tubular construction is used.

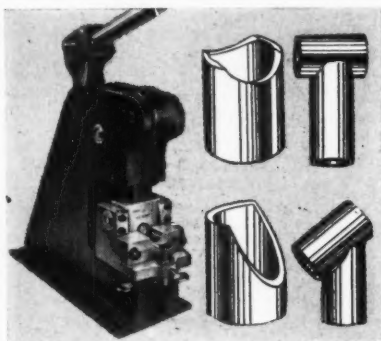
- Arc-Fit can be utilized in any power press.
- Arc-Fit can be furnished for any size tubing or pipe.
- A hand press can be supplied with Arc-Fit units for shearing pipe or tubing sizes 2 inches or under.

Manufactured Exclusively by

VOGEL TOOL & DIE CORPORATION

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Chicago 47, Illinois

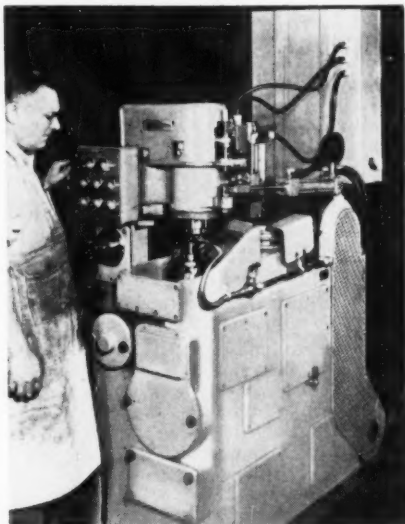


- For sizes over 2", angular cuts other than 90°, and slotting operations. Quotation furnished on request.
- Arc-Fit does not deform pipe or tube. No grinding or finishing operation is needed.
- Engineers can now design for tubular construction and cut costs.

Write today for circular and prices.

mounted together on a swinging arm. The ratio between the cam roller arm and the cutter arm is 2 to 1 which reduces any cam error $\frac{1}{2}$ on the finished part. Also, the master cam, in most cases, can be made considerably larger than the work piece so as to eliminate excessive cam rises.

The cutter spindle is driven by a V-belt from a $\frac{3}{4}$ h.p. variable speed unit, producing the infinitely adjustable speeds ranging from 425 to 4150 r.p.m.



The cutter spindle is mounted in a head having $3\frac{1}{4}$ " to 8" vertical adjustment from top of rotary table to spindle nose. The spindle quill is provided with hydraulic vertical feed with a total quill movement of $1\frac{1}{4}$ " controlled by dogs for rapid advance, feed and rapid return cycle. Adjustments for various diameters of work, cutter wear and depth of cut are easily obtained through micrometer adjustment of arm.

For complete specifications send for illustrated bulletin No. CM-1, to:

Sundstrand Machine Tool Co.
Dept. BB
Rockford, Ill.

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ARGUTO OILLESS BEARING **CO.**
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DELTA COMBINATION SPOT AND ARC WELDER

Recently developed by the Delta Manufacturing Division of the Rockwell Manufacturing Co. is "The Dual Weld" Combination Spot and Arc Welder, illustrated below. This new device takes less than half the floor space needed by the average 5-KVA spot welder plus the average 120-ampere arc welder. It is but 14" wide, 19 $\frac{3}{4}$ " high and 26 $\frac{5}{8}$ " long.



It is suitable for use in plant maintenance and repair departments, experimental laboratories, research departments, and in electric, electronic and other light metal fabrication industries.

The Delta-Milwaukee "Dual-Weld" unit spot welds, arc welds, solders and brazes. Its 10-inch throat depth permits spot welding to the center of a 20-inch sheet. A hand lever permits simple and quick changeover from arc welding to spot welding.

The one-piece welding horns of a high-strength copper alloy casting, eliminate inefficient electrical joints, reduce maintenance costs and provide maximum current for spot welding. The wound transformer core for low watt-loss is an exclusive feature. Equipped with silver alloy contact points for maximum life, the contactor is easy to change over for timer operations and provides simple operation and control of weld cycle in manual operation.

Full spot weld pressure adjustment gives infinite control from minimum to maximum pressure, important for light jobs. Infinite adjustment and current control via the calibrated current scale is also a feature. The current scale gives an accurate reading of current output, allowing job records to be kept for future reference on identical work.

For complete data on this and other new Delta-Milwaukee welding developments, write:

Delta Mfg. Division, Dept. BB
Rockwell Manufacturing Co.
Milwaukee 1, Wis.

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Production men turn to Jacobs Chucks as naturally as the die maker to his instruments when *precision* is prerequisite to success. Their powerful grip holds tools tight and true...their rugged construction maintains accuracy over a long service life. The

Jacobs Plain Bearing Chuck is the world-wide favorite as original equipment with manufacturers of portable tools and drilling machinery. Stocked by your Industrial Supply Distributor. The Jacobs Manufacturing Company, W. Hartford 10, Conn.

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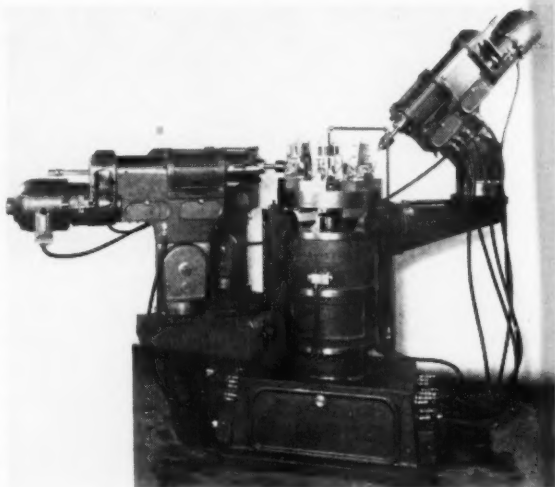
Jacobs Chucks

UNIVERSAL DRILLING MACHINE DRILLS AT ANY DESIRED ANGLE

A universal drilling machine designed for group drilling, reaming and tapping of holes at any required angle is introduced by the Onondaga Tool Corp. The machine, called the "Tri-Tec", includes a cylindrical base with attached arm supports which are adjustable radially into any desired position. Each support carries a vertically adjustable arm, to which a drill head may be mounted. These heads are adjustable either toward or away from the center of the machine, and are equipped with swiveling supports to allow for angular adjustment of 90° (45° above to 45° below the horizontal).

The work pieces are located in suitable jigs or chucks mounted on a faceplate which rotates on a spindle passing through the center of the base. Geared to this shaft is an index plate provided with holes corresponding to the holes to be drilled in one spindle revolution. Also attached to the spindle is a drum in which holes are drilled to correspond to the desired pattern of holes to be drilled in one revolution.

Mounted on a support bracket in the base of the machine, and covering the



surface of the drum is a group of switches which are actuated when the proper hole in the drum comes in contact with the switch arm. When the switch is closed, a solenoid is actuated, causing a switch or valve to be opened and the drill head to move forward, drilling the desired hole. As the drum rotates, other switches are actuated, causing the corresponding heads to operate and complete the desired pattern.

The machine is provided with tool torque control, designed to pick up

**HIGH GRADE TOOLS
SPECIAL GAGES
& CAM BLANKS**

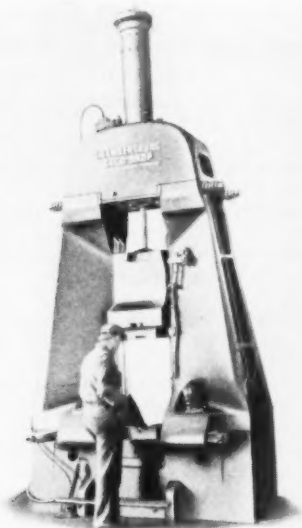
**AMERICAN TOOL WORKS, INC.
26 FRANCIS AVE. HARTFORD, CONN.**

excess torque pressure which may be applied to the point of the tool and transmit it to a reversing mechanism. This brings the tool out of the work piece, permitting self-cleaning. The drill then advances to the depth to which it had penetrated and slows down to drilling feed before starting to cut. In this manner, the unit can be used for deep hole drilling. For complete specifications on the "Tri-Tec", write:

**Onondaga Tool Corp., Dept. BB
Fayetteville, N. Y.**

CHAMBERSBURG "AIR-LIFT" HAMMER

The Ceco-Drop hammer, recently introduced by Chambersburg Engineering Co., is actually an "air lift or steam lift" hammer, since either steam or air power may be used to lift the ram.



This method of lifting the ram is one of the chief differences between the Ceco-Drop and the gravity drop hammer most generally in use today. The ram in the Ceco-Drop is attached to a piston rod operating in an air or steam cylinder. Air or steam is admitted to the cylinder, raising the pis-

AUTOMATIC CHUCKING AND INDEXING FIXTURE

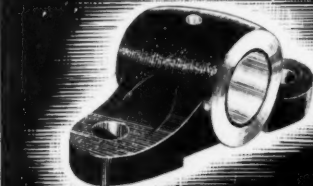


- 1.—1800 light cuts per hour.
 - 2.—Either horizontal or vertical position.
 - 3.—Collets changed instantly.
 - 4.—Automatically knocks piece out.
- Model D—Ratchet indexing only—1" cap.
Model E—Both degree and ratchet indexing
—Capacity up to 1".
Model F—Both degree and ratchet indexing
—Capacity up to 2 1/4".

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2634 Fullerton Ave. Chicago, Illinois



ton with rod and ram attached to the top of the stroke, at which point the air or steam exhausts, and the ram drops by gravity.

On its descent, the ram moves a rocker controlling the valve admitting air or steam to the cylinder, which lifts the ram and returns it to the top of its stroke. This process can be repeated either automatically or by individual strokes.

The Ceco-Drop hammer has a wide variety of uses ranging from the general line of forging work usually accomplished on board drop hammers to the cold forming of silver spoons in the leading silver shops of the country. For complete specifications on the Ceco-Drop, write:

Chambersburg Engineering Co.
Dept. BB
Chambersburg, Pa.

CARBIDE-TIPPED END MILLS AND HOLDERS

Lovejoy Tool Company, Inc., announces a complete line of carbide-tipped end mills and suitable holders. The Lovejoy positive locking device is used to hold the mills immovably in the holder, while allowing end-wise adjustment and quick change of cutters. An alternate adjusting shoe adapts the cutters to standard, set-screw type holders.

Two-flute end mills are stocked in diameters from $\frac{1}{2}$ " to 1", and four-flute mills from $\frac{3}{4}$ " to 2". All end mills have 1" diameter shanks, to assure complete interchangeability, and are available for cutting cast iron or steel.

One-flute end mills, 1" in diameter, are available for use when low cost and ease of sharpening are primary considerations.

Holders are available with No. 4, 5, 6 and 7 Morse Tapers, No. 7, 8 and 9 B & S Tapers, and No. 40 and 50 N.M.T.B. adapters.

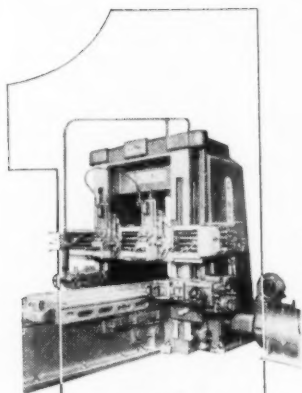
A descriptive bulletin on the new line of carbide-tipped end mills and holders is available free on request. Write:

Lovejoy Tool Co., Dept. BB
Springfield, Vt.

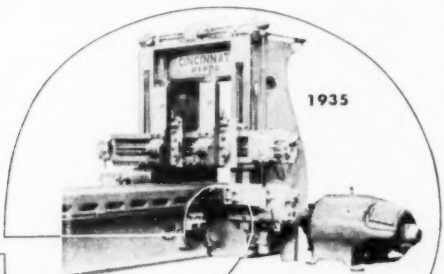
Do you want **100%** more production?

According to a survey in 1945, 68.7% of the planers in use in the metal working industry were over 10 years old. 90% of the machine tools used today are obsolete. Has your plant one or more of these planers?

One 1949 Cincinnati Hypro will replace two or more planers built before 1935.

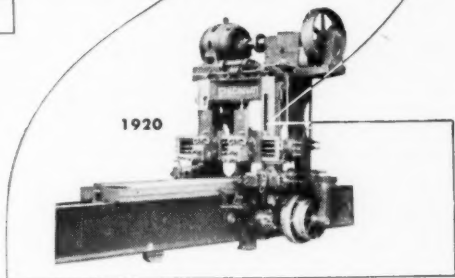


CINCINNATI
HYPRO
1949 Model



1935

1 equals in production 2 or more



1920

For complete information write for Bulletin 138

THE CINCINNATI **HYPRO** PLANER COMPANY

Subsidiary Giddings and Lewis Machine Tool Co., Fond du Lac, Wisconsin

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191

FLAGLER LOCK FORMING MACHINE

A new lock forming machine, the Model 20, introduced by the Roy G. Flagler Manufacturing Co., features four sets of lock forming rolls. The six-stage lock forming units form Pittsburgh lock, double seam, flat S-cleat, and drive cleat, respectively, in a single



pass. Roll stands are progressively geared so that the end roll turns at slightly faster speed than the first or starting roll. The locks are formed smoothly and without crimping, as travel of metal is not retarded between rolls.

The new unit makes Pittsburgh lock in 20- to 26-gauge metal inclusive, using approximately 1" of material. Flat S-cleat can be formed as short as 9" in 22- to 26-gauge metal using 3 1/4" of material, and drive cleat can be made as short as 4 1/2" of 20- to 26-gauge, using 2 1/8" of material. Double seam is made in 20- to 26-gauge, a 3/8" seam requiring approximately 1" of material. Uniform lock is provided, no resquaring of sheet is necessary.

The machine is powered by a 110/220 volt, 3/4 h.p. motor, with V-belt drive. Dimensions are: 24" wide, 48" long and 38" high. Bulletin 149 will be sent on

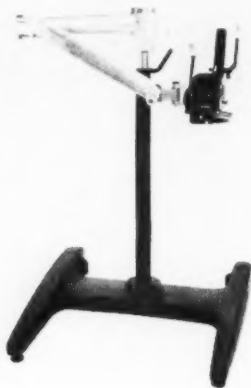
request to the manufacturer.

Roy G. Flagler Mfg. Co.
19321 Filer Ave., Dept. BB
Detroit 12, Mich.

UNIVERSAL PORTABLE TOOL MOUNT

Pictured is the new Acme E5 Universal Tool Mount provided with a Strapping Tool, recently exhibited at the National Materials Handling Exposition in Philadelphia. This useful device is equipped with rubber casters for easy portability and four leveling screws on the base for eliminating wobble on uneven floors. The mount has a 17" vertical movement without post adjustment, a post adjustment of 21", or a total of 38" vertical movement. The center post is spring-mounted for easy adjustment when the package falls out of the 17" vertical movement.

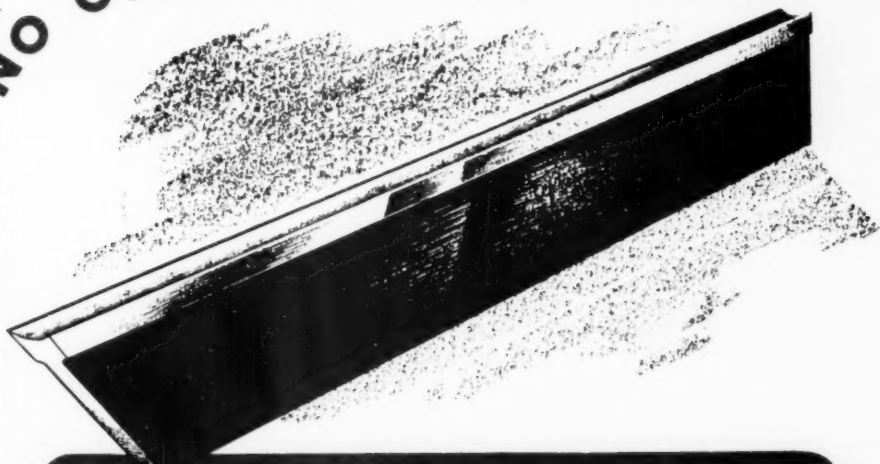
The strapping tool can be used in a 360° circle around the post, which facilitates easy cross-strapping. This mount is designed for all models of



Acme Steelstrappers and can be mounted in the floor without a base, or attached to conveyor or strapping table. For complete information on this unit, write:

Acme Steel Co., Dept. BB
2840 Archer Avenue
Chicago 8, Ill.

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Empire Tool Co. is the LEADER in cut-off blade developments—backed by twenty years' experience in cut-off blade manufacture.

Cut-off blades are tools subject to conditions different from those of other tools and will perform most efficiently only when specialists' recommendations are followed.

Available from stock are blades of four types of high speed steels developed to meet the demands of cut-off operations. And on short notice you can get blades of cast alloys and tungsten carbide.

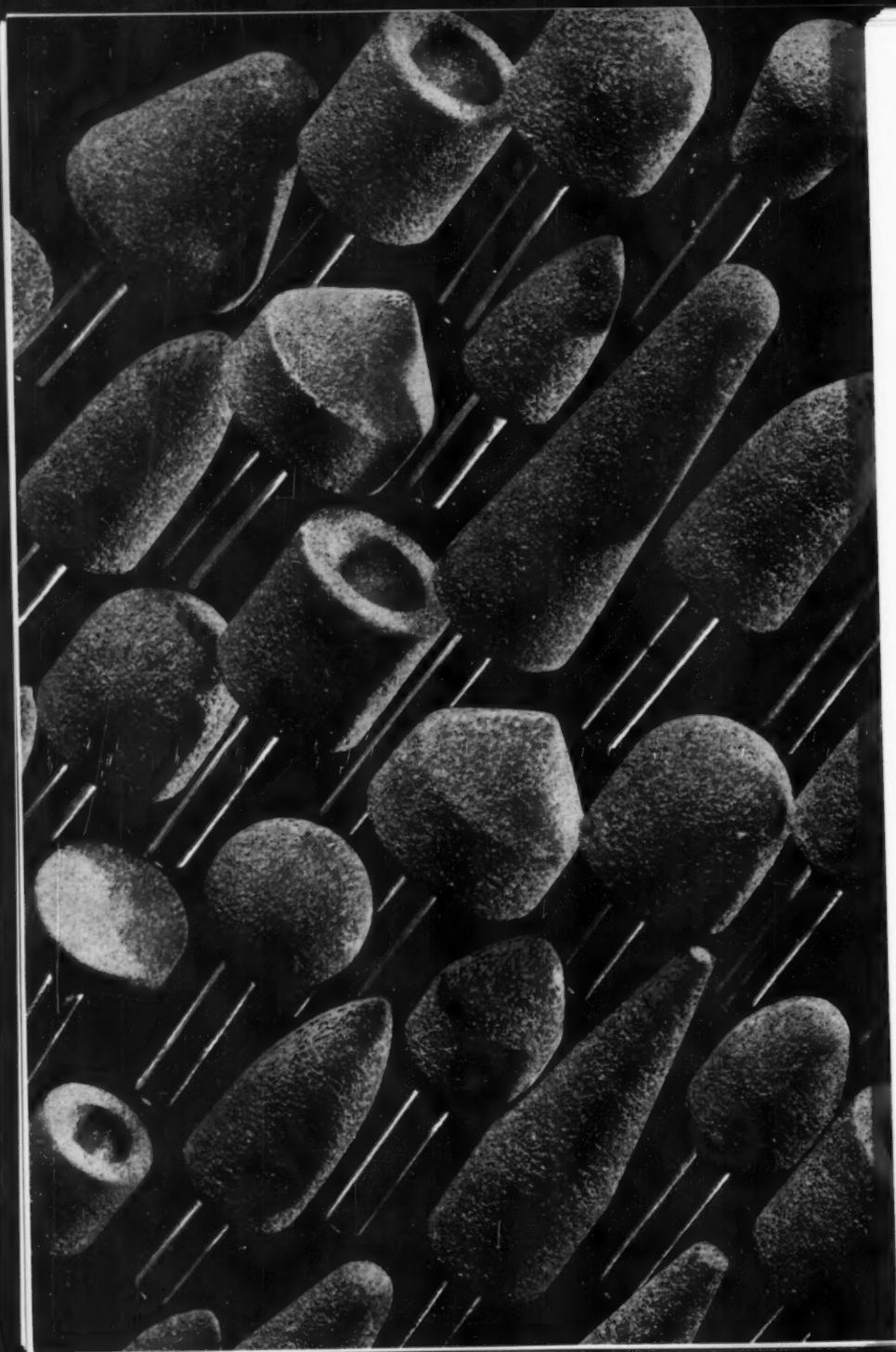
Empire's Luers blades are *guaranteed* to run faster and with less down time than any other.

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The Chicago Mounted Wheels you use today look simple enough—abrasive wheels mounted on steel shanks, but

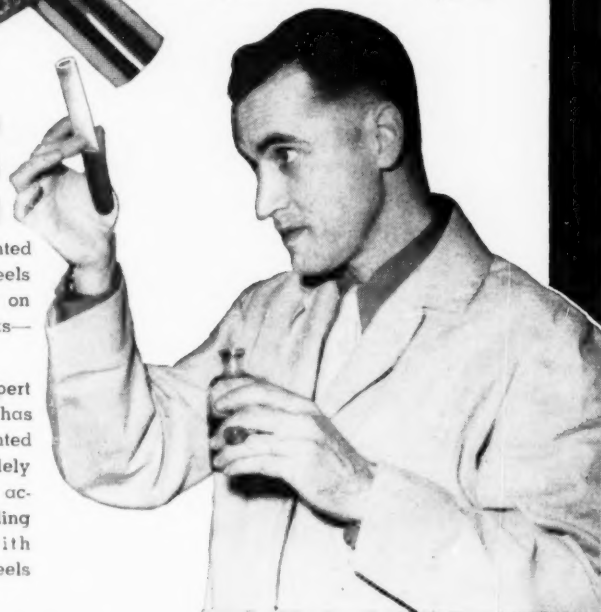


Those little wheels are the result of more than 50 years of know-how and more than 1001 tests to determine the most exactly perfect combination of grain, grade, bond, shape, shank length and steel analysis to do each job.

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Use Chicago Mounted Wheels—the first wheels ever to be mounted on their own steel shanks—today's finest.

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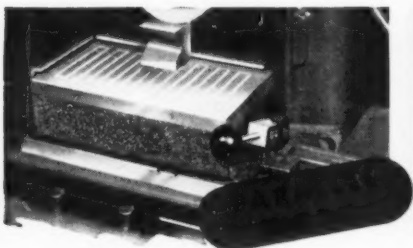
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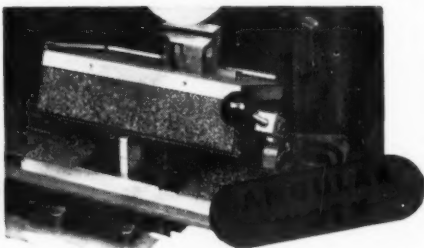
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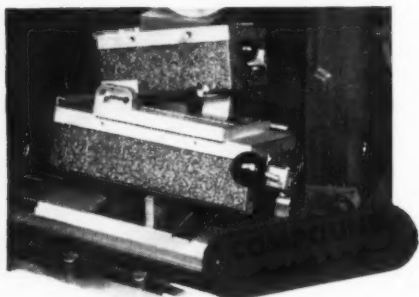
The **MAGNA-SINE** is more versatile than any other magnetic chuck



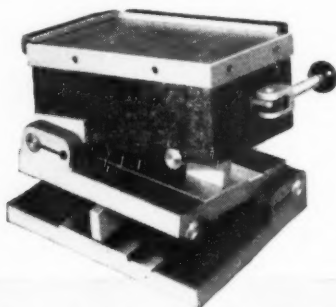
The Magna-Sine, when closed, serves as a conventional magnetic chuck for surface grinders. The chuck is permanent-magnet type and built to precision tolerances. Suitable for either wet or dry grinding.



When an angular job comes along, the Magna-Sine is accurately set up by inserting standard gauge blocks. The proper blocks are indicated in the Table of Constants furnished with each unit. Think of the saving; angular set-ups—to gauge block accuracy—made in a matter of minutes with the Magna-Sine.

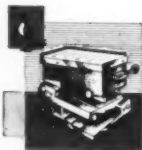


For compound angular work, add another single angle Magna-Sine.* The additional unit may be held securely by the magnetic chuck of the first unit. Any desired compound angle can be set up fast and with positive gauge block accuracy.



*This unit is the Magna-Sine for both single and compound angular set-ups. It can be used for parallel work, single angle or compound angle set-ups. Available in two sizes.

Send for completely descriptive bulletin showing models and prices. See how YOUR shop can save by using Magna-Sines on all surface grinders as well as angular set-ups for inspection, jig boring and other precision operations.



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Manufacturers of the MAGNA-SINE and Other Precision Tools

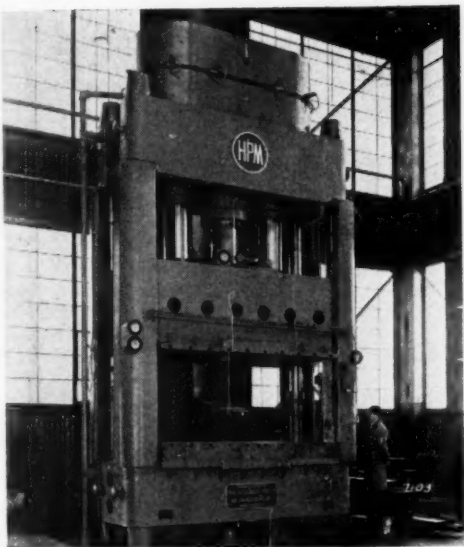
5722 Twelfth Street • Detroit 8, Michigan

H-P-M FASTRAVERSE SHEET METAL DRAWING PRESS

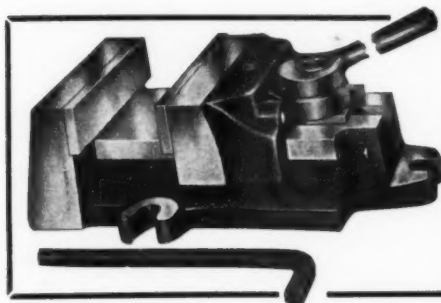
This giant H-P-M Fastraverse Sheet Metal Drawing Press of 1000/500 ton pressure capacity is designed to handle deep draw of exceptionally large dimensions. It has a platen of 120" x 72" x 70" daylight opening and 36" ram travel. It is equipped with a 300 ton H-P-M hydraulic die cushion with a platen of 58" x 52" and a 24" stroke. The bolster plate is removable.

The press is equipped with three main rams for the multiple press ram system of operation in two ranges of pressing speed. For a fast preliminary pressing at medium pressure, either the central main ram or the two outer rams can be employed with a 500 ton pressure. At a predetermined position, all three rams can be used to develop the high pressure required for final forming. A typical example of how this works is seen in the following speed variations. Where the 500 ton pressure is used, pressing speed is 58" per minute. After shifting over to all three rams, the pressing speed drops to 28" per minute.

The press is equipped with the H-P-M Closed Circuit Fastraverse system of operation, which regulates both the speed and direction of every press ram movement through control of the output of the pressure-generating H-P-M



radial pump. The Fastraverse action results in fast travel of the ram to the work, a slower, controlled, pressing speed, and the rapid return of the ram to neutral position, once the desired pressure has been reached on the work. The cycle of operation is fully automatic and is controlled by electric pushbuttons located at the operator's station. The entire operation



PLUNKET QUICK ACTION VISE for DRILL PRESS or MILLING MACHINE

Designed for production work, using an eccentric motion to apply pressure to jaws.

Eccentric motion moves jaw 5/16".

Size 6" jaws, 1 1/2" deep, opens 4".....\$63.00

Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders

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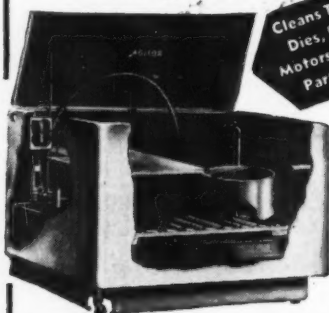
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is a stepless range with "inching" and jerky start and stop motions entirely eliminated.

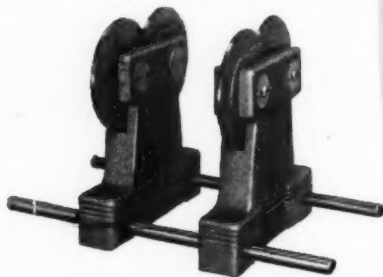
This press was built for a large boiler maker in the midwest and is typical of the diversified applications for which H-P-M all-hydraulic self-contained presses are designed. For complete specifications, write:

Hydraulic Press Manufacturing Co.
Dept. BB
Mount Gilead, Ohio

NEW CROWN BALANCING WAYS

The Crown Industrial Products Company announces a new Balancing Way which provides a quick and accurate means of statically balancing all types of rotating equipment, such as armatures, flywheels, crankshafts and fans. These units have hardened discs ground on the o.d., and mounted on ball bearings for maximum sensitivity and long life. The bearings are lubricated and sealed for life when the unit is assembled, requiring no further maintenance.

These balancing ways may be set up on the floor or on a bench and they are ready for use. No leveling is required. The revolving discs are mounted on solid end castings which are moveable on two shafts to accommodate



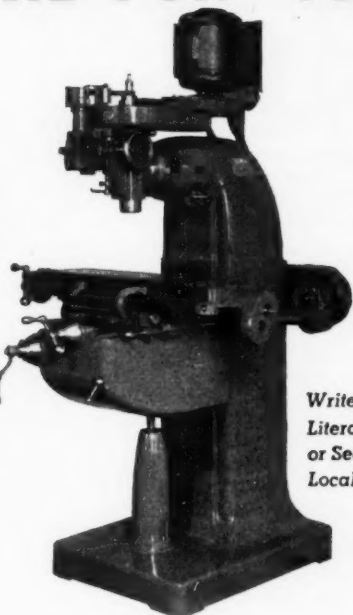
different sizes of work. These devices can be furnished in four sizes, based on the size of work they will accommodate: 10", 20", 42", and 60" swing. Additional information will be supplied upon request to:

Crown Industrial Products Co.
1321 W. 69th St., Dept. BB
Chicago 36, Ill.

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INDEX
AGAIN

The Milling Machine
That Means Savings
For You...



*Write for
Literature
or See Your
Local Dealer*

During the past year the new Model 50 Index Milling Machine has proven its great scope of usefulness in a wide variety of production line and general tool room jobs. Operational analysis has also shown that Index leads in savings on production time and labor over any other machine of comparable size or cost.

In addition to the freedom from chatter and solid rigidity built into the machine, each control and working part operates with smooth, accurate precision to hold fine tolerances. The ease with which any necessary rate of spindle and table feed can be obtained and the rapid traverse for re-positioning puts the Index Milling Machine definitely on the production line.

A complete line of accessories is available including end measuring rods and indicators, right angle milling head, both hand and power operated precision rotary tables and indexing attachments.

INDEX MACHINE CO.

545 N. MECHANIC STREET

JACKSON, MICHIGAN

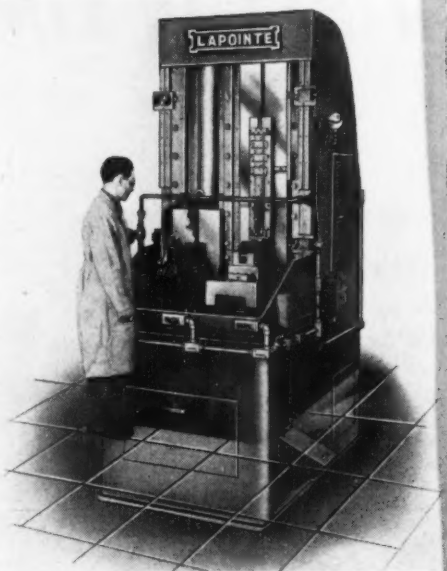
NEW BROACHING MACHINE INCREASES PRODUCTION

Incorporating both a new heavy duty double tip-down fixture and the new low pressure hydraulic system among its innovations, The LaPointe Machine Tool Co. introduces its new standard Double Ram Vertical Surface Broaching machine. The double tip-down fixture permits the operator to load the work conveniently on one table, while the other table is in broaching position. Special work holding units are adaptable for either fixture, and multiple operations can be accomplished on one set-up through the complete cycle.

A simplified speed control improves the performance for every type of broaching. A separate automatic force-feed system constantly lubricates the ways and other moving parts, and a safety switch stops the machine if the oil level in the lubricating reservoir drops below the safety point.

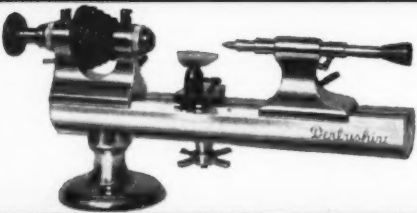
The new low pressure hydraulic system permits smoother operation, eliminating excess vibration and high pressure shock. A larger oil reservoir, in addition to special control circuit design, tends to keep the oil at a normal operating temperature.

Improved fabrication designs add greater rigidity for cutting tough steels. Full length mounting pads secure the main cylinder to the welded steel frame. Complete normalizing eliminates stresses and strains in the fabri-



cation and weldments. By keeping operational vibrations to a minimum, greater broaching accuracy is maintained.

The operating speeds of the fixtures and rams have been increased to assure greater production. Simplified speed controls allow a greater speed range with a minimum loss of time in setting up and changeovers. The over-



The WEBSTER-WHITCOMB
World famous for its
accuracy, dependability
and fine workmanship.
Chuck capacity .1969"
12" Bed, Swing 3.94"
Lathe Makers
Since 1874

F. W. DERBYSHIRE, INC., WALTHAM 54, MASSACHUSETTS, U. S. A.

load capacity of the machine has been increased 35% above rated tonnage. Conveniently located limit switches simplify the stroke adjustments, stepping up the overall production of the machines.

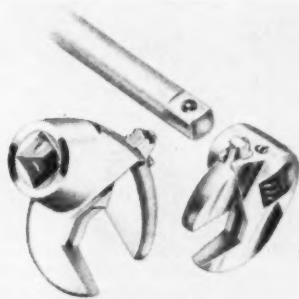
Hydraulic cushions are provided in all hydraulic cylinders, eliminating shock when the piston travels to its extreme position. All the control valves, gasket mounted in the compartment, are available for inspection and removal without disturbing the piping. The electrical control panel is available for inspection from the outside of the machine. Conveniently located pressure gauges are located near each ram for quick inspection by the operator in the case of overloads and dulling of tools.

An attractive 6-page folder, showing the new design features, may be obtained upon request to:

The LaPointe Machine Tool Co.
Dept. 133-BB
Hudson, Mass.

NEW ADJUSTABLE CROWFOOT ATTACHMENTS

For the first time, J. H. Williams & Co. has successfully combined, through the medium of one tool, the flexibility of the detachable socket system with all the advantages of the open-end ad-

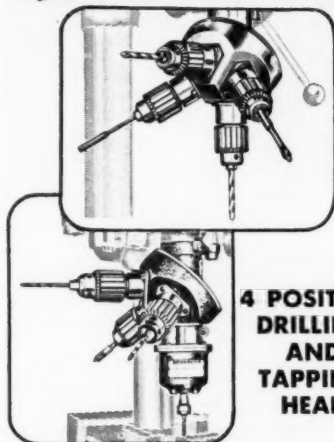


justable wrench. The new Adjustable Crowfoot Attachments, when used with the numerous handles and parts available, present a variety of heretofore non-existent combinations. Machinists

Are your
DRILLING
and **TAPPING**
Costs Too High?

You can
SAVE as much as
75% with

QUADRILL and
QUAD-TAPPER



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DRILLING
AND
TAPPING
HEAD

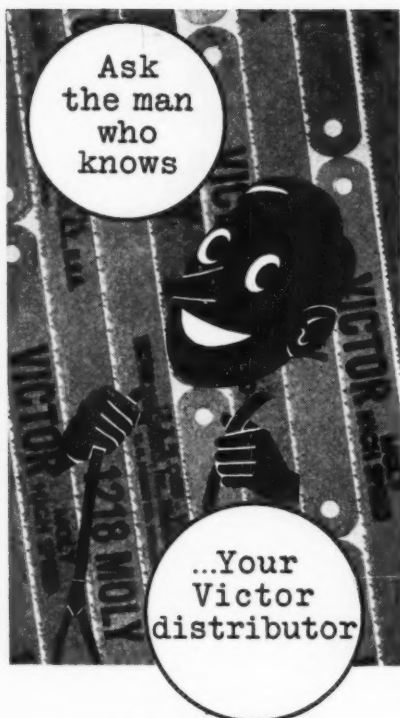
Now, more than ever, production costs must come down. The low cost QUADRILL and QUAD-TAPPER attachment wipe out all lost motion. Pays for itself in no time. Instantly operator switches from one size drill to another. No unproductive time. Increases output. Cuts costs way down.

Write today for literature and prices.

CHICAGO

DRILLET CORPORATION

1735 N. Winchester Ave., Chicago 22, Ill.



Which blade? How many teeth per inch? How many strokes per minute? These and other questions puzzle many a hack saw user. If they puzzle you, see your Victor distributor. He has the experience and knowledge to show you how to cut metals and plastics faster, easier and better...how to choose the right blade for various materials...how to get the most from each stroke of the hack saw. Yes, a little advice from the Man Who Knows will save you time and money in the long run.

Ask your distributor for free copies of "Metal Cutting" and the famous Victor Wall Chart containing helpful hints on the selection, care and use of hack saw equipment.

VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y., U. S. A.
Makers of Hand and Power Hack Saw Blades, Frames and Band Saw Blades

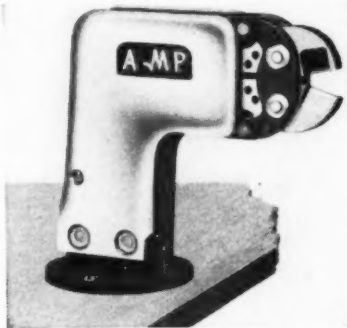
and mechanics everywhere are finding new approaches to difficult service problems with the use of these ingenious attachments. They will perform nut turning jobs that were thought impossible.

The attachments are made from selected alloy steel in two square drive sizes, $\frac{3}{8}$ " and $\frac{1}{2}$ ", with capacities of $\frac{3}{4}$ " and $1\frac{1}{2}$ " respectively. Square shoulders on the body portion of the sliding jaw provide maximum and positive bearing against working stress. Williams Booklet No. A-50 lists both sizes of these attachments plus a complete line of handles and parts. Send for a copy to:

J. H. Williams & Co., Dept. BB
400 Vulcan St.
Buffalo 7, N. Y.

NEW BENCH PRESS ACCOMMODATES SEVERAL HEADS

A foot-operated bench press with cutting head has been developed by Aircraft-Marine Products, Inc. Trade-named Ampli-Versal it does a clean cutting job on wire, rod, or sheet metal and is designed so that the cutting head (supplied with the press) can be removed and any one of seven other special "Amp" heads quickly inserted.



Other available heads perform such operations as indenting, knock-outs, nibbling, "U"ing, notching, and installing Amp Solderless Terminals. Blank heads are also available.

The foot-operated Ampli-Versal Bench Press leaves both hands free to

guide the work and also permits the operator to have an unobstructed view of the work.

The Ampli-Versal comes equipped with cutting head. It is boxed complete with foot pedal, etc., ready for set-up.

Complete information on Ampli-Versal contained in Catalog No. 37450 is available from the manufacturer:

Aircraft-Marine Products, Inc.
1581 No. 4th St., Dept. BB
Harrisburg, Pa.

USEFUL STEEL STRAP CALCULATOR

For buyer or user of steel strapping, the new Strap Calculator offered by A. J. Gerrard & Co., is an effective means of saving time and preventing expensive miscalculations. The Calculator enables its user to determine with slide rule precision, the length and weight of strapping required for any given binding operation being planned. It provides the desired figures with two quick turns of its surface, eliminating pencil work, as well as haphazard guessing. It enables the strapping user to plan his inventory requirements accurately.



The Calculator is a dual purpose device, since its opposite side is an Anti-Corrosion Strap Selector, showing which types of strapping metals are most effective under exposure to various types of atmospheres, chemical conditions, soils, water or gas fumes. The Calculator is useful to purchasing

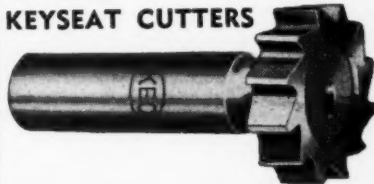


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Made of finest high speed steel. Available in all standard sizes. Always in stock for immediate delivery. Specials made to your specifications.

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High speed. Right hand. $\frac{1}{2}$ " shank. Diameters from $\frac{1}{4}$ " to $1\frac{1}{2}$ ". Standard sizes in stock for immediate delivery. Complete set —41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.



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High speed steel. Reamers from $\frac{1}{4}$ " to 1" regularly furnished with 60°, 82°, 90° included angle. Specials made to your specifications.

LATHE MANDRELS



Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from $\frac{1}{8}$ " to 1" are .0005" undersize at small end, from $1\frac{1}{2}$ " to 3", .001" undersize. Immediate delivery.

Write for Literature

Illustrated literature and prices on all KEO Products mailed on request.

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

FISHER BENDER



This sturdy, hand-power bender will bend up to:

$\frac{1}{2}$ " square or round iron
2"x $\frac{1}{2}$ " channel iron
2 $\frac{1}{4}$ "x $\frac{5}{16}$ " flat iron cold

Weight:
40 lbs.

Immediate
Shipment

New circulars covering our line of benders, cutters, and punches available.

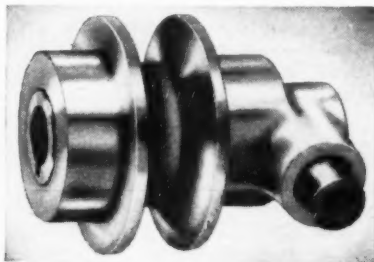
T. H. LEWTHWAITE MACHINE CO.
312 East 47th St. New York 17, N. Y.

agents, engineers, maintenance men, and others charged with responsibility for strapping costs and preservation of plant equipment. It is obtainable without charge or obligation upon request, by writing:

A. J. Gerrard & Co., Dept. BB
1950 No. Hawthorne Ave.
Melrose Park, Ill.

NEW CONGRESS V-BELT CLUTCH

A new V-belt clutch has been announced by Congress Drives Division, Tann Corporation. It consists of a split pulley, the flanges of which can be separated or closed by a flick of the finger. When the flanges are separated, the belt rests on a sleeve between them, without motion or friction or wear. As the flanges are clicked together, they engage the belt smoothly and easily, permitting the use of a smaller power unit (electric motor or gasoline engine) than would have to be used with a heavy load or high initial torque.



The Congress V-Belt Clutch is made in four sizes for "A" belts, covering o.d.'s from 2.5" to 4", and pitch diameters from 2.35" to 3.85", and four sizes for "B" belts, covering o.d.'s from 2.5" to 4", and pitch diameters from 2.2" to 3.7". The overall length of all models is 3.25" and a wide range of bore sizes is available.

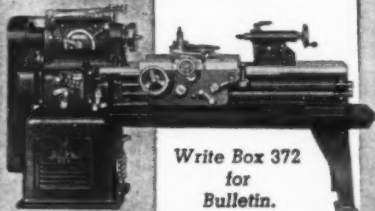
Action is positive. The load is picked up gradually, and the pulley does not spin inside the belt. The lubricated bearings are sealed against dirt.

Congress Drives Division,
3750 E. Outer Drive, Dept BB
Detroit 34, Mich.

**CARROLL
AND
JAMIESON
LATHES
15" AND 16"**

12 Speed Geared
Head Motor Drive
Timken Mounted
Spindle

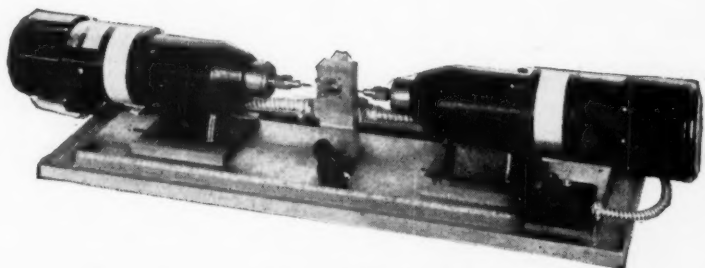
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Liberal
Dimensions



Write Box 372
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Bulletin.

**THE CARROLL & JAMIESON
MACHINE TOOL CO.**

BATAVIA • OHIO, U. S. A.



Automatically Tapping Two Opposed Holes Simultaneously

THIS 2-way bench fixture, which we recently designed and built, incorporates 2 Model "KT" Govro-Nelson Automatic Tapping Units which tap two opposed 8-32 holes simultaneously in a metal lamp part (shown on base).

When the part is located by the operator, it actuates a micro-switch, causing both Units to tap simultaneously. Tapping time: One second. Output: As high as 1800 per hour, depending upon operator efficiency.

If you have similar operations, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

**WRITE FOR
*Literature***

GOVRO-NELSON CO.

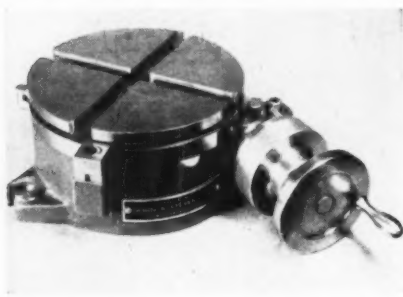
*Machinists of Precision Parts
for 25 Years*

1933 Antoinette, Detroit 8, Mich.

Automatic **DRILLING UNIT**

STEVENS 5" ROTARY TABLE

A small, accurate circular attachment for use on bench or small milling machines, drill presses or grinders, is the 5" Rotary Table manufactured by John B. Stevens Inc. The table section and



taper hub are of one piece, and both contacting surfaces are scraped for uniform fit on the base and in the taper bore in the base, with a wide flange attached to the lower end of the hub

for contact fit to the underside of the base. This construction assures long life of the original fitting.

The design permits a ready method for checking the proper fit of the worm in gear and binding, as well as for disengaging and re-engaging for the free rotation of the table. The ratio of the worm and gear is 1 to 72. The worm is integral with the shaft.

Dimensions include a height of $2\frac{3}{4}$ " hole through the center is $\frac{5}{8}$ ". The length and width of fit on machine table are $7\frac{1}{16}$ " and $4\frac{7}{8}$ " respectively. From the center to the hand wheel measures $4\frac{1}{2}$ ". For using the 5" Rotary Table in angular positions, the manufacturer can supply an angle plate which can be tilted at any angle from horizontal to 70°. For complete specifications, write:

John B. Stevens, Inc., Dept. BB
480 Canal St.
New York 13, N. Y.

ABRASIVE SURFACE GRINDERS

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P. O. Box 700

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1725-1731 First Ave.

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1807 Elmwood Ave.

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571 Washington Blvd.

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715 Penton Building
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Tidewater Supply Co.

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Marshall & Huschart Machy. Co. of Ind.

Chamber of Commerce Building
KANSAS CITY, MO.
Blackman & Nuetzel Machy. Co.

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Murrison, The W. S. Co.
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Henes-Morgan Machy. Co. Ltd.
2026 Santa Fe Ave.

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Satterlee Co., The
118-120 Washington Ave., N.

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Dixie Mill Supply Co., Inc.
901 Tchoupitoulas

NEW YORK CITY 17
Rudel Machinery Co., Inc.
100 East 42nd St.

NORFOLK 1, VA.
Tidewater Supply Co., Inc.
P. O. Box 839

OMAHA 2, NEB.
Cardinal Supply & Mfg. Co.

427-30 Sunderland Bldg.
PHILADELPHIA 3, PA.
Swind Machinery Co.

Broad St. Station Bldg.
PITTSBURGH 22, PA.
Mutch & Merryweather Machy. Co.

717 Liberty Ave.

ROANOKE, VA.
Tidewater Supply Co.

ROCHESTER 4, N. Y.
Keller, George Machy, Co.
509 Commerce Bldg.

SAN FRANCISCO 7, C.
Janison Machinery Co.
20th & Tennessee Sts.

SEATTLE 4, WASH.
Wallide Machinery Co.
2726 First Ave., S.

SHREVEPORT, LA.
Dixie Mill Supply Co., Inc.
200 Edwards Street

ST. LOUIS 8, MO.
Blackman & Nuetzel Machy. Co.
3713 Washington Blvd.

SYRACUSE 2, N. Y.
Briggs, C. H. Mach.
Tool Co. Inc.

Onondaga Hotel Bldg.
W. HARTFORD 7, CT.
Rudel Machinery Co., Inc.
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ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, R. I.

ABRASIVE

ACCURACY ROSETS PRODUCTION

Cuts Off Tubing, Pipe and Shafting— **FAST**

If your production requires cutting off tubing, pipe or shafting in quantities, particularly in long lengths, check the figures below against your present time.

1/2" Tubing

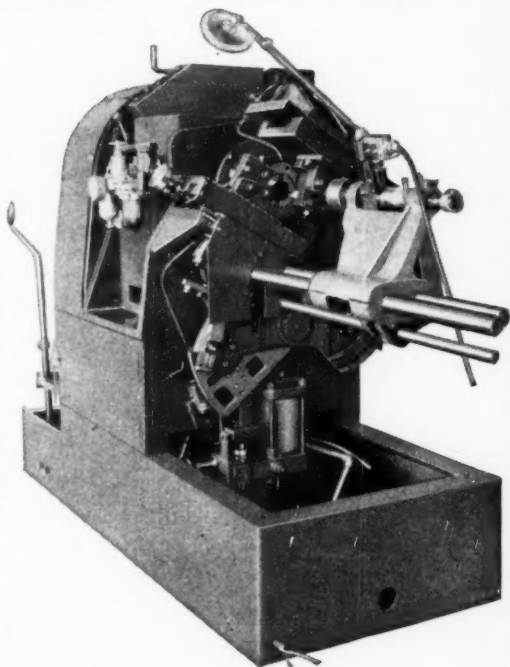
This machine cuts off and chamfers both outside edges of 1/2" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

1 1/4" Cold Rolled

This machine cuts off and chamfers both ends of 1 1/4" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts and chamfers both outside edges of 1" long, at the rate of every 3 seconds.



The NEW MODERN AUTOMATIC CUTTING-OFF MACHINE

These popular, time saving machines are now available in two sizes, handling work up to 3" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

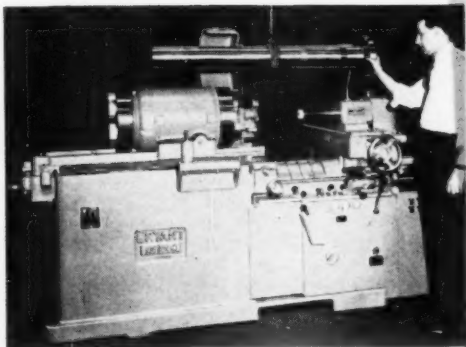
WRITE FOR ILLUSTRATED CATALOG.

MODERN MACHINE TOOL CO.
Jackson, Michigan

BRYANT DOUBLE CHUCK WORKHEAD HANDLES PRECISION GRINDING

The illustration demonstrates the size of work which can be chucked on the Bryant No. 112-M machine. The workhead can be moved longitudinally to position the work for grinding. The machine is designed to grind special internal tapers on parts such as machine tool spindles and special axles. A sine bar attachment provides accurate taper control. Inside and outside diameters, and face can be ground at one chucking. An attachment (not shown) allows the workpiece to be indexed 180° so that concentricity is assured when both ends of the piece are to be finished. For large o.d. work, the workhead is moved to the left end of the machine and a steadyrest is used to support the end to be finished.

The workhead can be removed and replaced by a fixture so that spindles can be ground while rotating on their own bearings. The workhead base is



of the swiveling type, providing for grinding a maximum included angle of 30° .

The wheelhead assembly is moved hydraulically to the rear of the machine to facilitate loading of long pieces. Multiple position stops can be provided

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QUALITY & SERVICE**



**American
DRILL JIG
BUSHINGS**

**IMMEDIATE
DELIVERY!**

Yes, first for quality—American Drill Bushings, precision made from finest oil hardened tool steel, wear longer and give maximum jig drilling accuracy. Concentric ground lead insures perfect alignment, speed and safety. Complete stocks maintained at all times by exclusive distributors throughout the U.S. and Canada for immediate free delivery.

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1110 So. Santa Fe Avenue, Los Angeles 21, Calif.
SPECIALIZING ONLY IN DRILL BUSHINGS



for grinding step bores. For complete specifications, write:

Bryant Chucking Grinder Co.
350 Clinton Ave., Dept. BB
Springfield, Vt.

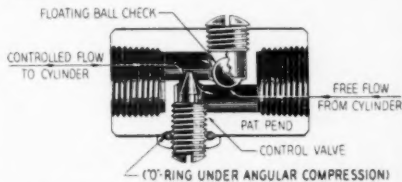
FLOW CONTROL VALVE FOR CYLINDER SPEED CONTROL

A unique Flow Control Valve for air or hydraulic cylinder speed control which provides more accurate control of cylinder speed plus unrestricted flow from the cylinder, has recently been announced by Pneu-Trol Devices, Inc.

The new Flow Control Valve, it is claimed, assures full use of air or hydraulic cylinder power, because it eliminates abnormal pressure of the exhaust from the return side of the cylinder, increasing the cylinder effective power pressure, by means of spring loaded checks.

When the flow is to the cylinder (in either direction) the ball check instantly closes and the flow path is

directed through the flow control valve, which has a wide range of adjustment. The reverse flow from the cylinder is unrestricted, since the unloaded ball check opens wide on a slight change in pressure.



The Flow Control Valve is only slightly larger than the pipe size, which permits more compact piping arrangements. It is made in $\frac{1}{4}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ " pipe sizes from brass hexagon roll bar stock; all other parts are stainless steel. For further information and literature, write:

Pneu-Trol Devices, Inc., Dept. BB
3122 No. California Ave.
Chicago 18, Ill.

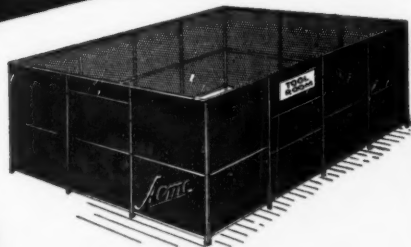
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Standard Sections Woven Wire Mesh Panels and Doors to enclose Tool Cribs, Stock rooms and other enclosures.

IMMEDIATE DELIVERY

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DIE HEADS

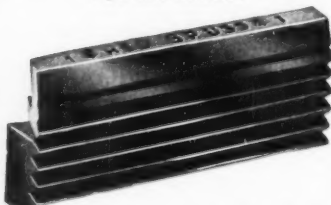
Chasers To Fit Any Type of Die Head

Also Solid Taps

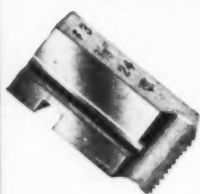
can be ordered on one purchase order. This eliminates any chance for error when special threads are required. We offer a Hygrade Product with prompt deliveries and a guaranteed saving.



Any form of thread can be furnished on taps and chasers.

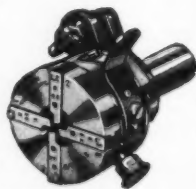


Tangent Chasers can be furnished in cut or ground threads.



Radial chasers can be furnished in milled, tapped or ground form. Circular chasers furnished in ground form only.

The most complete line of threading tools offered by any one company. Multiple thread milling cutters — shell or shank type.

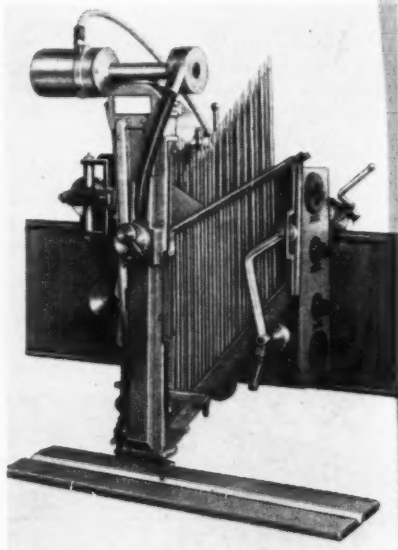


Write for Catalog.

The CHASO TOOL CO., Inc.
Royal Oak, Michigan

PORTABLE WELDING HEAD PRODUCES CONTINUOUS WELD

A new portable welding head for arc welding which produces continuous welds using standard coated electrodes is announced by Elge Associates. New York manufacturers and consulting engineers. The company claims that the



new unit produces faster welds than those obtained by hand welding methods, since the arc is not interrupted during the automatic change of electrodes. The first model will weld sheet and plate and will join right angles or oblique sections. Longitudinal welds on curved surfaces such as pipes and tanks are also easily made.

The unit is equipped with the necessary controls for precise adjustment of welding current, regulation of arc length, as well as vertical and horizontal adjustments. Carriage speed adjustment between 1" and 40" per minute are quickly made. Track fabricated of tubing is used to guide the carriage. Straight track is furnished with the welding head. Curved or circumferential track is also easily fabricated. The

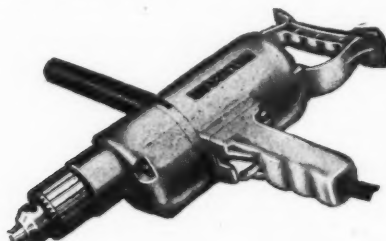
electrode magazines may be refilled during the operating period, permitting long unbroken welds.

The welding head is ruggedly built of aluminum, steel, and heat-resistant alloys; it is light enough to permit moving and setting up by one man. The company claims the mobility and adaptability of the welder will permit its use for most types of welds heretofore requiring hand arc welding. For complete structural details, write:

Elge Associates, Dept. BB
16 E. 71st. St.
New York 21, N. Y.

NEW STANLEY $\frac{1}{2}$ " ELECTRIC DRILL

A new, compact, light-weight, general purpose $\frac{1}{2}$ " capacity electric drill, model No. 112, has recently been announced by Stanley Electric Tools. An important feature of this new drill is the chuck spindle offset (see illustration) which permits the operator to drill in close quarters without removing pipe or spade handles.



Other features of the Stanley No. 112 Drill include heat treated alloy steel gears, thrust ball bearing on spindle, strong aluminum alloy housing, an automatic release safety switch with locking device and a Jacobs three-jaw chuck. A bench stand No. 524 is available in which No. 112 can be mounted to make a convenient drill press. The drill's capacity is $\frac{1}{2}$ " in steel, and $1\frac{3}{8}$ " in wood; chuck speed is 325 r.p.m., no load, and 225 r.p.m. under full load.

For complete specifications, write:
Stanley Electric Tools, Dept. BB
New Britain, Conn.

THE NEW

Star

The New
Improved
Elliott
Flexible
Shaft Machine



Patent
Applied
For

Flexible Shaft Machines

and Attachments. Complete Flexible Shaft Machines . . . unit drives; ball-bearing handpieces; motor couplings; sanding drums, angle heads; arbors, etc.

Assemblies

We can furnish flexible shaft assemblies in all sizes and any design, with rubber, metal or plastic casings; to improve the appearance and wearing qualities.

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ELLIOTT
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202 Prospect Ave. Binghamton, N. Y.

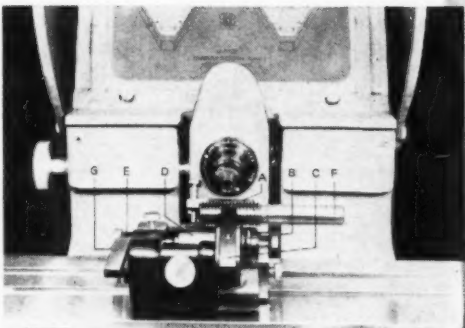
UNIVERSAL SCREW STAGE FOR J & L COMPARATORS

The new Universal Screw Stage for checking screw threads on Jones & Lamson Optical Comparators is as rapid as a snap gage and more positive than an elaborate set of pitch diameter, lead and form gages. The device eliminates the cost and uncertainty of gage wear.

"Screw Thread Standards for Federal Services" specifies tolerances for pitch diameter that include all errors of pitch diameter, lead and angle. Therefore, the full tolerance on pitch diameters cannot be used unless the lead and angle of the thread are perfect. The Jones & Lamson universal screw stage checks pitch diameter, lead and angle as rapidly as the pitch diameter alone can be checked with a snap gage.

It provides the only method which simultaneously compares all the elements of the thread with a master gage. It checks at a glance, lead (for the whole length of engagement of the screw), pitch diameter and thread angle; crest, root and taper. Also the enlarged shadow instantly reveals wear of tool, chasers, rolling dies, or grinding wheel. It not only detects each individual error, but also shows their cumulative effect. It is the only universal stage that will measure a wide range of diameters and pitches as well as right or left threads, according to Jones & Lamson.

A pair of rolls, corresponding to the



pitch of the thread to be inspected, is mounted on the roll shaft, the fixed roll being spaced longitudinally from the center of the lens, a distance equal to the length of engagement of the screw to be inspected. A master gage is then staged on the rolls. It is also supported and held by the adjustable backstop "A" and the spring operated clamp "C".

The enlarged shadow of the master thread is then made to coincide with the correct tolerance outline on the chart, thus representing a perfect screw in a perfect nut. The master gage is then replaced by the production screw to be inspected. The shadow of the production screw thread must fall between the maximum and minimum tolerance outlines on the comparator chart, to pass inspection. The space between the outlines represents the permissible

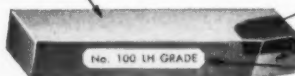
STANDARD CARBIDE BLADES . . .

For All Types of
Milling Cutter Bodies

Check These Advantages:

Carbon Tool Steel Shank

Lower Cost
Stock Delivery
Guaranteed
Workmanship



Oversize Tip-Diamond Lapped Flush
With Top of Shank

10° Relief Angles
Preformed On Tip and Shank

Blade Number and Grade Visible
After Blade Is Assembled in Body

We Fabricate All Types of Carbide Tools. Write for Bulletin No. 101
or Send Print or Sample for Quotation. Distributor Inquiries Invited.

WISCONSIN CARBIDE TOOL CO., 3343 N. 35th St., Milwaukee 10, Wis.

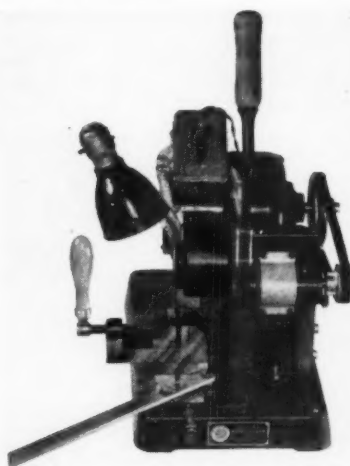
tolerance for the class of fit required. Lateral displacement of the shadow shows lead error, vertical displacement shows pitch diameter variation.

This staging fixture, with four pairs of rolls, will accommodate any screw of a given form from 3/16" to 1" diameter, and any pitch from 6 to 44, whether right hand or left hand. For complete details, write:

Jones & Lamson Machine Co.
Dept. BB
Springfield, Vermont

NEW ROUSE HAND MILLER ATTACHMENTS

Several attachments have recently been developed for the Rouse Hand Miller, the high speed, ball bearing, motor driven machine made for handling light cuts in brass, aluminum, and similar materials. The Hand Miller, manufactured by H. B. Rouse & Co., is an efficient unit wherever small parts are finished.

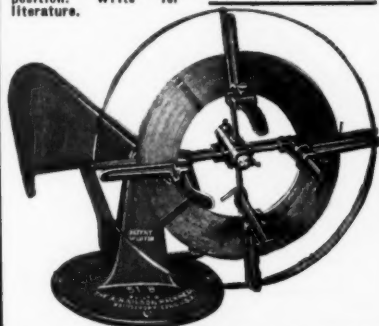


The No. 7 Vise, one of the new attachments, considerably increases the Hand Miller's range and productivity. It is fitted with a specially slotted removable jaw, enabling it to hold odd shaped pieces, and can also be converted into an economical jig for use

NILSON

WIRE AND RIBBON STOCK REELS ★

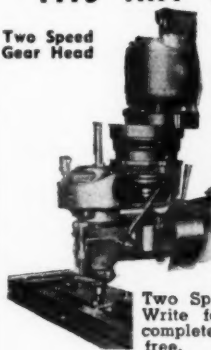
Reel is loaded by one man in less than one minute. . . . Automatic balancer . . . eliminates hand lifting . . . avoids strains and accidents. Locking device automatically locks reel in position. Write for literature.



THE A. H. NILSON MACHINE CO.
BRIDGEPORT, CONN., U. S. A.

"FITS ANY PORTABLE MILLING HEAD"

Two Speed
Gear Head



Now you can double the number of present speeds, prolong tool life, permit use of longer cutters, increase production and obtain other advantages by using the Olson

Two Speed Gear Head. Write for bulletin with complete details. It's free.

OLSON

INDUSTRIAL PRODUCTS, INC.
42 WEST WATER STREET
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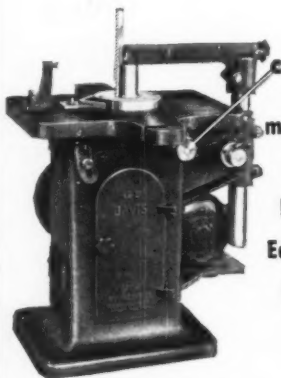
- Cools hot bearings
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- Saves wear on moving parts
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DAVIS KEYSEATER CO.

407 1/2 Exchange St. Rochester 8, N. Y.

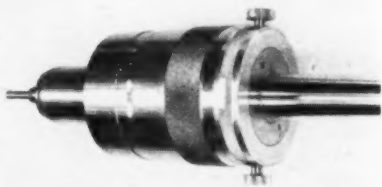
on other equipment. To reduce losses due to personnel injuries, Rouse has designed the new No. 9 cast iron Safety Cutter Guard. The operator locates and adjusts the guard either to the left or right of his particular job, making it impossible for him to injure his hands. For further efficiency and convenience, the No. 9 guard may be drilled for a coolant fitting which will convey the coolant directly to the cutting tool.

Detailed information on the new attachments of the Rouse Hand Miller will be furnished upon request to:

H. B. Rouse & Co., Dept. BB
2214 N. Wayne Ave.
Chicago 14, Ill.

THE B & T JIG GRINDER HEAD

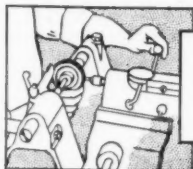
An ingenious British Jig Grinder Head has recently been imported for American distribution. It is a product of Boneham & Turner, Ltd., precision engineers, Mansfield, England. The B&T Jig Grinder Head is described as constructed to slip into the spindle of any normal Jig Borer, enabling bores to be ground accurate to size and location. It is stated to have been proved over many years of use in Great Britain. The device possesses several unique features, including the adjustment of the feed



while running, and interchangeable grinding heads with maximum speeds of 20,000 and 40,000 r.p.m., covering bores of from 1/32" to 3 1/2" in diameter.

For complete specifications on this new tool, write to the United States agent of Boneham & Turner, Ltd., for illustrated catalog:

L. G. Rose, Dept. BB
30 Church St.
New York 7, N. Y.



MODERN PRECISION UNITS!

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Have you a problem for which no ordinary material offers a solution? Come to the people with diamond knowledge.

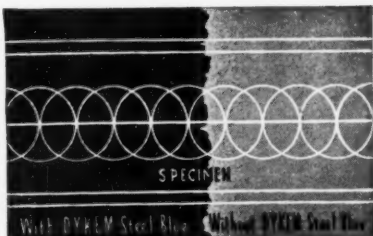
Our specialty diamond products include cutting and boring tools, single and double end hones, glass cutters, engine turning and engraving tools, precision lapped radius diamonds, gage point diamonds, ball radius dressers (180"), diamond core drills in sizes from .080" to 1" for glass, sapphire, ceramics and other hard materials.



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DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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★ THE ★ WONDER CUTTER

The lowest-priced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to 3/8-in. round or 3/8-in. square and band iron up to 1/2 in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

Write today for prices.

THE FEDERAL FOUNDRY SUPPLY CO.

4602 East 71st St., Cleveland, Ohio



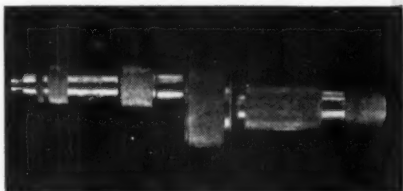
NEW STEP-UP HANDPIECE TREBLES FLEXIBLE SHAFT GRINDER SPEEDS

The No. 1300 Step-Up Handpiece recently developed by Wyzenbeek & Staff, Inc., is applicable to any Wyco Flexible Shaft Machine, old or recent models, either multiple or single speed, except the Junior and Wycoflex models. By replacing the standard handpiece or angle-head with this step-up device, the speed of the unit can be increased three times, by means of gear step-up. The device can be used with carbide cutters, rotary files, mounted grinding wheels, abrasive rolls, and other applications.

For example, on standard 3600 r.p.m., single speed Wyco Flexible Shafts or Machines, the operator can use small diameter files, mounted grinding wheels or abrasive sanders with a speed of 10,800 r.p.m.

The handpiece is available in two sizes to fit the various Wyco Flexible

Shafts. A special new Wyco machine, with a constant speed of 11,000 r.p.m., is now offered, giving speeds of 33,000 r.p.m. by using this new handpiece for carbide cutters with $\frac{1}{4}$ " or $\frac{1}{8}$ "



shafts. Further details may be had upon request to:

Wyzenbeek & Staff, Inc., Dept. BB
838 W. Hubbard St.
Chicago 22, Ill.



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MADE BY THE MAKERS OF:
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Literature

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15 MORRELL STREET ELIZABETH 4, N. J.

"THE ORIGINAL MARKING SPECIALISTS"



HOWALD Carbide MILLING CUTTERS HAVE



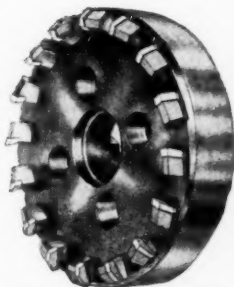
Standard, SQUARE, Inserted Blades
without Serrations and Grooves.

Easily adjustable
Blade Locking Devices.

PERMIT

Blades to be rapidly and accurately
set to any desired cutting angles.

Blades to be adjusted to close limits.
Minimum grinding of Cutter Blades.



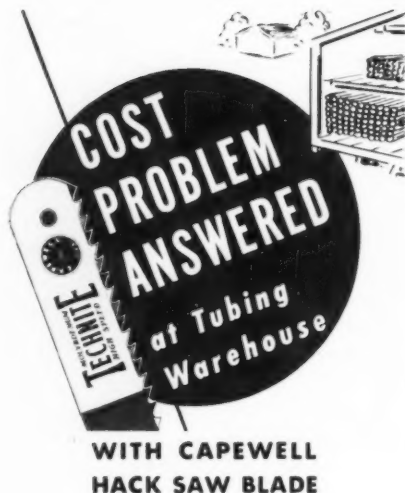
Request Bulletin 23B for complete details of HOWALD CUTTERS.

DISTRIBUTOR INQUIRIES INVITED

W. T. HOWALD MACHINE WORKS
182 Sigourney Street Brooklyn 31, N. Y.

When Writing Advertisers Please Mention MACHINE and TOOL BLUE BOOK

217



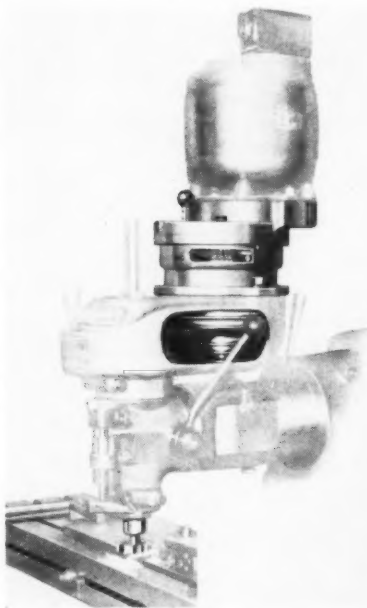
At a tubing warehouse there is plenty of work for power hack saw blades, and the expenditure for blades is something to be reckoned with. At a certain Eastern warehouse a thorough study was made of tube sawing problems . . . methods were examined, and blades were compared. In this connection Capewell's *Technite* was found giving the most efficient service. Faster cutting was combined with long blade life. Similar results can be secured in your own plant, if you will let your Capewell Industrial Distributor help you determine the right Capewell blade for your particular work. A phone call will bring immediate service.



METAL WORKING CRAFTSMEN FOR OVER 65 YEARS

OLSON TWO-SPEED GEAR HEAD STEPS UP MILLING PRODUCTION

A new unit which offers a wide application is the Two Speed Gear Head recently developed by Olson Industrial Products, Inc. The device was originally designed for a Bridgeport Miller Head, to allow greater range of operation, but it can be fitted to any similar portable vertical milling head, using the present motor and drive pulley.



Advantages claimed for the Olson Gear Head include the extension of tool life with the proper speeds; smoother finishes; the use of larger milling cutters; controlled boring of larger holes; increased production through the use of the correct milling speeds. The flexible connection between the motor and the gear head permits easy mounting, and on cramping of the motor shaft. The ratios are 1:1 and 6:1, thus doubling existing milling spindle speeds. With a six-step pulley, for example, twelve speeds,

ranging from approximately 45 to 4500 r.p.m. may be attained.

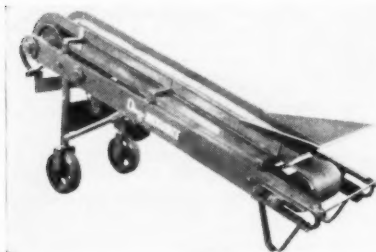
The new unit is claimed to be able to withstand severe strains. The housing is made of heavy aluminum, with ball bearings and hardened steel gears. For complete specifications, send for 4-page illustrated folder.

Olson Industrial Products, Inc.
40 W. Water St., Dept. BB
Wakefield 59, Mass.

DINGS PORTABLE MAGNETIC SEPARATORS

A portable, inclined belt type magnetic separator to meet foundry requirements for rapid recovery of scrap, and for sand cleaning, is introduced by Dings Magnetic Separator Co. A Dings Alnico Perma-Pullley is used as head drive pulley for the inclined belt, automatically effecting a sharp separation of magnetic and non-magnetic material at the discharge end of the conveyor. The separator is provided with a motor drive for a belt conveyor. The magnetic pulley is weatherproof and magnetic permanence is guaranteed for the life of the separator by the manufacturer.

The forward end of the inclined conveyor is supported by a steel frame mounted on two wide-faced steel wheels designed to make the unit easily portable over rough ground and sand.



Standard separators are available in lengths of seven or ten feet with belt widths of 12, 14, 16, 18, 20 or 24 inches. Capacities range from 40 to 80 tons of sand per day. For complete specifications, write:

Dings Magnetic Separator Co.
4247 W. McGeogh Ave., Dept. BB
Milwaukee 14, Wis.

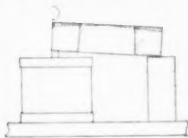
UNBELIEVABLE THINGS that BODY FLO can do!

BODY FLO

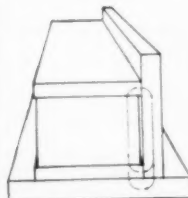
**MAGNETIC
CHUCKS**



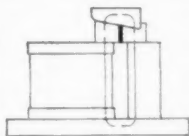
If you can visualize Magnetic Holding Power that exceeds the strength of a Samson, THAT is BODY FLO!



Exclusive feature with BODY FLO Chuck, grinding a die for shear by the simple method shown.



Instantaneous vertical set-ups possible, because sides of BODY FLO magnet are square with top and bottom.



All elements bonded together magnetically; shaped adapter out of l.c. steel, supports tapered cam for grinding.

SEND FOR

**"Magnetic Chucking
Revolutionized"**

**Consultants in Magnetic Tooling
for Production**

Magnetic Holding Devices, Inc.
2034B EAST 22nd STREET
CLEVELAND 15, OHIO

THE EQUI-GRIP HAND VISE—A MULTI-PURPOSE TOOL

A useful, efficient tool for fast handling of small production parts is the Equi-Grip Hand Vise made by George-Anderle Manufacturing Co. The tool stresses positive adjustable pressure control from feather touch to a heavy toggle grip. The wide jaws maintain a firm grip even when only light pressures are applied, as on thin-walled tubing or delicate work pieces. Rounds, tubing, etc., can be picked off the bench by straddling them with the jaws and clamping with the thumb. The jaw plates are removable and can be changed to suit the job at hand; jaws are also adjustable for the size of work; when closed on a work piece, the jaws are locked, yet a light upward thumb pressure will snap them open and release the work.

The vise body, movable jaw and lever are made of light weight, strong cast aluminum magnesium alloy. This construction makes the vise a useful tool for soldering and welding operations.

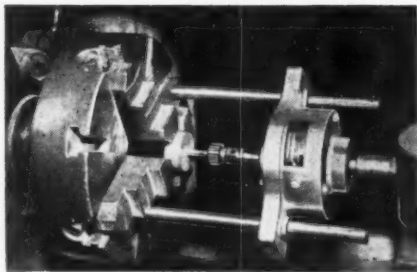


The toggle and adjusting mechanisms are plated steel sections. All parts are accurately machined and interchangeable.

The standard Equi-Grip Hand Vise is equipped with two plain mild steel

HERE'S HOW:

TO TAP ... and back out ... WITHOUT STOPPING THE WORK OR REVERSING THE MACHINE



**The
ERRINGTON
AUTO-REVERSE
TURRET LATHE
TAPPING HEAD**

can also be used on drill press work for production-tapping. For this the Errington Head has a 2 to 1 reverse, and uses guide-bars to hold and steady the case.

The Errington Auto-Reverse Turret Lathe Tapping Head is a new tool, practical, time-saving, money-saving. In a turret lathe setup, as illustrated, it allows you to tap the hole and back out the tap without stopping the work or reversing the machine. It's easy to operate: you simply feed the tap into, and out of, the drilled hole while the work is turning in the one direction.

The new Tapping Head is a money-saver in this respect, too: with the aid of a friction chuck, you can tap blind holes without any possibility of tap breakage.

Send for Complete Information

Established 1891

ERRINGTON Mechanical Laboratory, Inc.

Main Office and Plant: STATEN ISLAND 4, N. Y.

Chicago Office:

6701 N. Sioux Avenue

New York Office:

170 Broadway

jaws, $\frac{1}{4}$ " thick; they can be machined to fit a particular job, or the manufacturer can furnish grooved or profile plates in steel, brass or other material to fit individual applications. Overall length of the tool is $7\frac{1}{2}$ "; jaws are $1\frac{3}{4}$ " wide, $\frac{3}{4}$ " thick, equipped with standard $\frac{1}{4}$ " thick jaw plates. For complete specifications, write:

George-Anderle Manufacturing Co.
Box 24, Dayton View Sta., Dept. BB
Dayton 4, Ohio

NEW ATLAS 24" BALL BEARING JIG SAW

Whatever the cut or type of material—wood, composition, plastic, fibre or metal—the new Atlas 24" Jig Saw is engineered and built to handle the job faster, at lower cost.

The unit is provided with an extra-heavy base, overarm and table, plus a precision drive that keeps vibration at a minimum for smooth cutting. The 14" x 14" ground iron table is supported by large trunnions spaced $9\frac{3}{4}$ " apart, making a rugged support for heavy stock.

The four speeds—570, 858, 1220 and 1658 r.p.m.—provide the correct speed for every operation. Easy-to-adjust chucks take all types of blades and sabres up to $5/16$ " wide and machine files up to $1/4$ " wide.

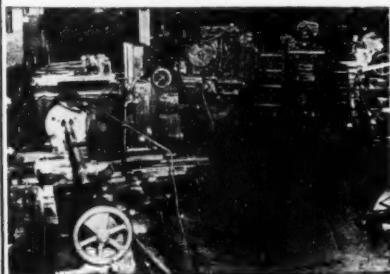


The ground steel drive shaft spins on widely spaced SKF ball bearings, operating shafts are supported by long Oilite bronze bearings. The table tilts 45° to right, 15° to left, and indexes 90° to handle long stock. The overarm is

INTRODUCING ...

M.F.P.

Machine Shop Floor Patch



GREASE & OIL RESISTANT

Shipped in Complete Unit!

FLEXROCK M.F.P. has been carefully developed to meet and overcome the conditions existing in machine shops. Thorough tests have proved that it offers so much resistance to grease and oil disintegrators as to give absolutely satisfactory service on machine shop floors.

ADVANTAGES

- (1) M.F.P. offers extremely high resistance to oil and grease, is shockproof and provides the maximum of foot-ease and light reflection.
- (2) M.F.P. is far more grease resistant than other patching materials. It requires only $\frac{1}{2}$ inch "chip out" around edges.
- (3) In addition to its shatter-proof properties, M.F.P. has a surface hardness and smoothness reducing load-drag to the minimum.
- (4) M.F.P. can be applied over concrete or wood, and is of the same color as concrete.
- (5) It is shipped as a complete unit—there is no sand, stone, cement nor any other material to buy.
- (6) M.F.P. is extremely easy to apply and a good job can be done by anyone who will follow the simple directions.

Write for New Folder

FLEXROCK CO. 3634 FILBERT STREET
PHILADELPHIA 4, PA.

M.F.P.

**(MACHINE SHOP
FLOOR PATCH)**



easily removable for cutting long panels.

Specifications include a 24" throat capacity, 2 1/4" maximum depth of cut; blade lengths are 6" or less; the unit operates from 1/3 or 1/2 h.p., 1725 r.p.m. motor. For illustrated catalog, write:

Atlas Press Co., Dept. BB

2350 N. Pitcher St.

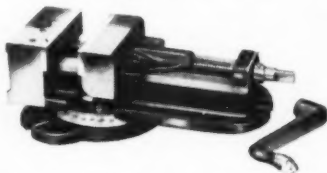
Kalamazoo 13D, Mich.

GRAHAM SWIVEL BASE VISE HAS 6" JAWS

A serviceable swivel base vise, equipped with 6" jaws and an adjustable zero pointer has been introduced by the Graham Manufacturing Co., Inc. This useful piece of equipment is of rugged construction, precisely engineered. It has complete 360° rotation, with a positive two-point lock-in position. The zero pointer permits exact coincidence with zero on the base scale to be obtained.

The base of the unit is removable, so that the vise can be used plain, if necessary. The jaws are drilled and

tapped for the use of jig attachments and special jaws. This vise takes the No. 3 size attachments and jaws. A chip retaining shield protects the swivel base. The screw never extends under the jaw opening at any time, thus any possibility of damage to the screw during drilling operations is eliminated.



Standard flush design of jaws is followed, with faces, top and side held to close tolerance. For complete details on this new unit, as well as Graham Centering and Multi-Purpose models, write for Bulletin No. 44 to:

The Graham Manufacturing Co.

150 Bridge St., Dept. BB

East Greenwich, R. I.

**REDUCE FINISHING COSTS
FROM
30% to 90%**

**SCHAUER
speed lathes**

**POLISH • LAP
BURR • FINISH**

Plants using these low-cost, high-production machines, say: "Polishing time cut in half!" "Smoother, more uniform finish!" "Substantial savings effected in de-burring operations." In your plant, where secondary finishing operations are required - save with Schauer-A type for every purpose.

Write Today for Illustrated Catalog 480

THE SCHAUER MACHINE CO.

• ORIGINATORS OF TODAY'S SPEED LATHES

2064 READING ROAD

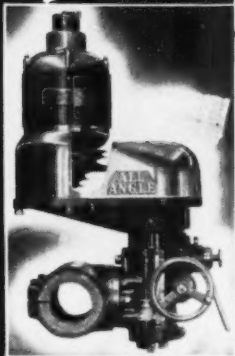
CINCINNATI 2, OHIO, U. S. A.



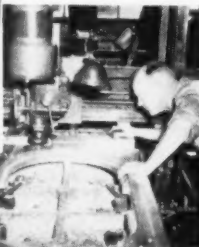
Fray

"ALL-ANGLE" MILLING ATTACHMENT

did a better job—on **THIS** job!



A Fray Type 4 head milling Z-50 cast aluminum patterns at a rate of 12" per minute, employing a cutter 4" in diameter. Finish produced, R. M. S. 40. Parallelism held within .001 inch.



A heavy duty unit with direct drive and planetary back gearing giving 3:1 reduction, the Fray Type 4 Milling Attachment operates at speeds up to 6400 RPM. A 1½ h.p. motor supplies abundant power for carbide cutting.

For further information

See your Dealer or Write for Literature

Fray

MACHINE TOOL COMPANY

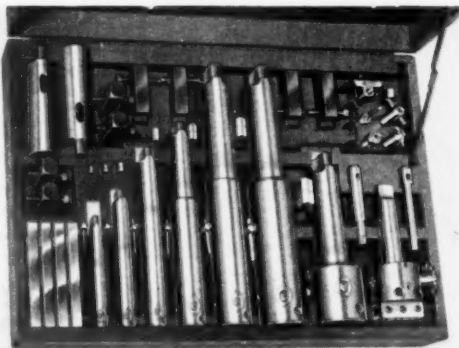
515 West Windsor Road
Glendale 4, California

Davis SUPER MICROMETER BORING TOOL SETS

Now Available in 8 Complete Selections for Bores
From ½" to 13" Diameters

These sets provide the convenience of stub boring tools for use with all horizontal and vertical boring machines, drill presses and jig borers.

Write for
Valuable Boring
Tool Data
Free



DAVIS BORING TOOL DIVISION

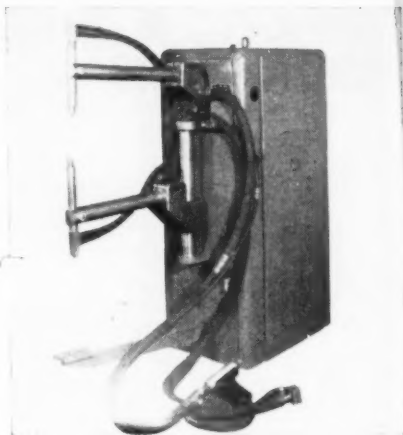
GIDDINGS & LEWIS MACHINE TOOL CO., Fond du Lac, Wis., U. S. A.

WAITCUS PORTABLE PRODUCTION SPOT WELDERS

Waitcus Manufacturing Co., makers of "Stored Energy Power Supply" Spot Welders, announce their portable production Spot Welders. These rugged units provide up to 12,000 amp. low voltage rectified d.c. current from standard 110-220-440 volt a.c. outlets. They give spot-welding capacity up to 50 kva merely by plugging in to existing supply lines.

Waitcus Spot Welders have the advantage of high capacity under the limitations imposed by a restricted power supply. They are portable, compact, self-contained units. They will supply a d.c. output ranging from 4000 to 12,000 amps. either singly or in combination of units. The a.c. current is rectified within the unit, and accumulated in internally water-cooled storage cells, from which 5 to 70 spot cycles at rated d.c. output are constantly available, off-cycles being employed to recoup the cells.

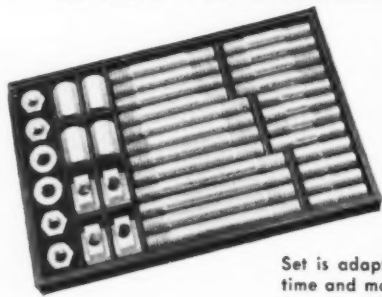
These units are approved by utility engineers and have been proved in ex-



tensive use by representative manufacturers. Waitcus Spotwelders enjoy increasing acceptance as the solution to problems entailing added spotweld-

Save Set-up Time! Cut Your Costs!

with the **HANDY STUD & NUT SET**



Each set has 40 pieces—precision made from quality steel, case hardened for long life, hard chrome plated. Hundreds of plants use them—to profit and advantage. Investigate! Write Today!

Here are the highest quality "T" Slot Nuts, Studs, Washers and Coupling Nuts you can buy—conveniently boxed—and at lowest cost! All sizes for all machines. They save machine and man hours—pay for themselves many times over.

Quickly Makes Any Length ➡

Set is adaptable, versatile. Assures rigid clamping. Save time and money with these handy, low-cost Stud and Nut Sets. Immediate delivery!

Write Today for Bulletin and Prices

NOBLE & STANTON, INC.

1004 BROADWAY • BEDFORD, OHIO



ing capacity and other production operations, such as soldering, brazing, etc., under conditions of power shortage, often prevalent today. Where such problems do not exist, the advantages of these units operating at meter rates, point the way to practical and economical applications.

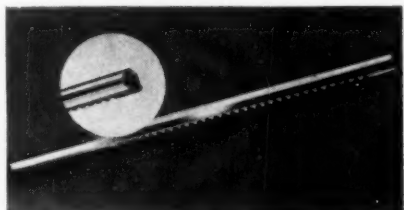
The model No. 300-1-G is illustrated. It is adaptable for push or squeeze-gun operation. It has a d.c. output of 4000 amps., 12,000 watts, equivalent to 18 kva. For complete specifications on the entire series of Waitcus Spot Welders, send for 4-page illustrated folder to:

Waitcus Manufacturing Co., Dept. BB
638-42 So. Clark St.
Chicago 5, Ill.

DUMONT KEYWAY PUSH BROACH

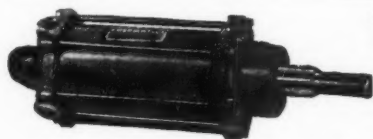
The du Mont Corporation announces an improved "Minute Man" production type keyway push broach for use with either hydraulic or hand operated arbor presses, for multiple production of

keyways in moderate quantities. This broach supports itself in the hole so that no guide is necessary. Only one pass is required to complete the standard depth of cut. Each broach is ground to fit its specific hole diameter. This



new production type keyway push broach is available in keyway widths from 1/32" to 1/4" and for any desired hole diameter. For complete details, send for descriptive folder to

The du Mont Corporation, Dept. BB
Greenfield, Mass.



Series "E" Model 1400-E Pivot Mount

These cylinders are made to your order with any length stroke you request in any of these bore sizes:

1½, 2, 2½, 3, 4, 5, 6, 8, 10

In ordering please write mounting, bore, stroke and piston rod thread you want.

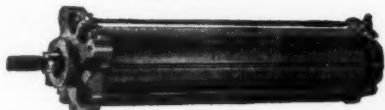


Cylinders—any bore, any stroke, any mounting, air, water, hydraulic
Series "E" Model 1300 Rear Flange Mount

1 WEEK DELIVERY ON THESE STANDARD CYLINDERS



Series "E" Model 1500 Foot Mount

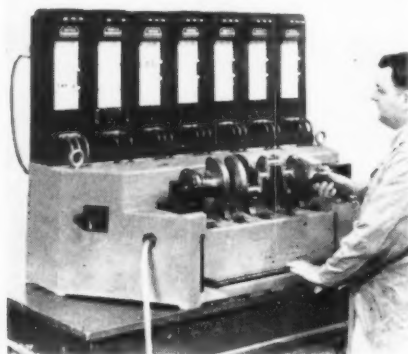


Series "E" Model 1200 Front Flange Mount

PNEUMATICS INCORPORATED
OF PLYMOUTH INDIANA

SHEFFIELD CRANKSHAFT CHECKING PRECISIONAIRE

A gaging machine using twenty Precisionaire tubes has been developed by The Sheffield Corporation for accurate



checking of an automobile crankshaft for size and out-of-round.

The five main bearings are checked

simultaneously with five Airsnaps, each having three sets of jets so as to gage midway between the flanges and at $\frac{1}{8}$ " from each flange. These Airsnaps are floated so that they may move forward and backward to allow for misalignment due to possible warpage in the crankshaft. At the same time two other Precisionaire jets check the seal diameter at one place and the width of the rear main bearing.

The diameter at each end of the pin bearing and the breakdown of the radius at the cheeks are checked manually with an individual Airsnap having three sets of jets. For additional information on this gaging unit, write:

The Sheffield Corp., Dept. BB
Dayton 1, Ohio

NEW CHUCK FEATURES INSTANT JAW ACTION

The Whiton Machine Company announces the "Air-O-Torque" Chuck, a heavy duty power chuck combining the best features of both an air operated chuck and power wrench operated chuck. The "Air-O-Torque" Chuck has a center hole, and allows feeding stock through its center.

This chuck has a housing which is attached directly to the lathe head. The lathe spindle extends through the housing and is attached to the chuck. Thus the housing remains stationary while the chuck is free to move with the spindle.

The operation of the "Air-O-Torque" Chuck is similar to that of regular gear scroll chucks, with an air motor driving the pinion which engages the scroll, causing the jaws to close or open. Immediately upon stopping the machine, the scroll can be engaged by the pinion in the "Air-O-Torque" Chuck, regardless of the chuck's position on the spindle, and jaw action started, eliminating the necessity of turning chuck to desired position.

Power for the chuck's operation is supplied by an air operated motor, providing pressure to insure positive grip at all times. The desired gripping capacity can be attained by a valve ad-



"BUILT-IN"
FEATURE
Saves 50%
FLOOR SPACE

Hammond
**NO-DUST
GRINDER**

- Requires only 6 1/2 square feet.
- Protects employees' health — and nearby machine tools from dust and grit.

For 10", 12" and 14" wheels.

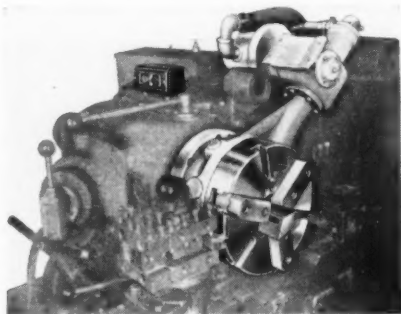
WRITE FOR CATALOG



Hammond Machinery Builders
1614 DOUGLAS AVE., KALAMAZOO, MICH.

justment which controls the amount of air pressure used in operating the air motor.

The "Air-O-Torque" Chuck can be applied to any unit allowing the necessary clearance. Positive braking for holding the chuck while operating jaws



can be provided when necessary. Operating control for gripping and un-gripping jaw action is a hand lever. For complete details, write:

Whiton Machine Co., Dept. BB
New London, Conn.

ARCALOY AC-DC WELDING ELECTRODE

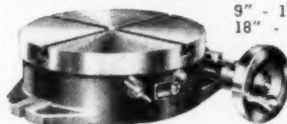
The Alloy Rods Company have just announced their new Arcaloy a.c.-d.c. stainless welding electrode which is claimed to embody several improvements over conventional a.c.-d.c. electrodes currently on the market.

The manufacturers state that the new electrode has excellent arc starting qualities on all types of a.c. welding equipment, and outstanding welding characteristics on either a.c. or d.c. It is stated to have a smooth, stable arc with fine-spray weld metal transfer. The slag is easily removed, leaving no secondary film. The bead is uniform and full throated with straight-line feathered edges, thus less cleaning, grinding and polishing time is required.

This new Arcaloy a.c.-d.c. electrode is available in all chrome-nickel analyses. Descriptive folder is available upon request to:

Alloy Rods Co., Dept. BB
York, Pa.

TROYKE ROTARY TABLES WORM WHEEL OPERATED ROTARY TABLES . . .



9" - 12" - 15" -
18" - 21" - 25"

BALL BEARING STATION INDEXING TABLES . . .



12" - 15" - 18"

See your
dealer or
write for
Catalog 14

TROYKE MFG. CO.
CINCINNATI 9, OHIO, U.S.A.



ALMOND DRILL CHUCKS

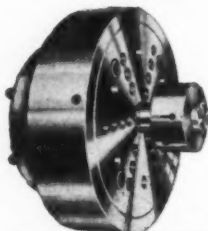


Maximum gripping power with
extreme accuracy and long life.

Write for Catalog

T. R. ALMOND MFG. CO.
ASHBURNHAM, MASS.
U. S. A.

Get on the
INSIDE
of your second operation jobs

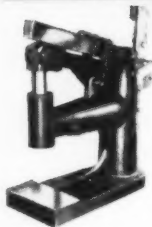


with a **SPEEDGRIP PRECISION, INTERNAL CHUCK, AUTOMATIC or HAND** operated.

GUARANTEED to improve quality and reduce costs. Send for **SPEEDGRIP** folder today.

SPEEDGRIP CHUCK, INC.
ELKHART, INDIANA

HIGH SPEED



**AUTOMATIC
STAKING MACHINES**

Cut your assembly costs with **HIGHSPEED** . . . for staking or riveting fixed or movable joints at a rate of more than 1000 pieces per hour! Foot treadle . . . safe . . . adjustable and uniform hammer blow.

COLD RIVETERS

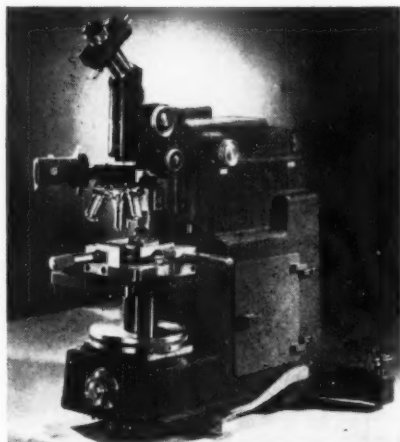
Let us send you a free survey of your riveting problems. Send samples of your work completed to the riveting stage. We'll return them along with guaranteed production data. No obligation . . . write today.

**HIGH SPEED HAMMER
CO., INC.**
304 NORTON ST
ROCHESTER 5, N. Y.



KENTRON MICRO HARDNESS TESTER

A new device for Micro Hardness Testing is announced by Kent Cliff Laboratories. The Kentron Micro Hardness Tester is claimed to be the first tester to apply accurately dead weight loads as light as 1 gram, for use with either the Knoop Indenter or the Vickers Type Indenter.



The accurate application of this 1 gram dead weight load is said to open new avenues in the Micro Hardness Testing of minute particles, inclusions, constituents, thin metals, transition zones of welds, wire, foil, ceramics, plastics, etc.

The Kentron Tester is a bench type instrument and is hand-operated to eliminate vibration. An adjustable oil dash pot, for controlling the speed of load application and the time of load retention, is easily adjusted to suit specific testing requirements. A mechanical stage, consisting of a stationary plate, transfer plate and specimen block, provides a convenient means for positively locating and positioning the exact area of the test specimen underneath the indenter and microscope. The microscope is mounted so it can be operated conveniently. The unit is stably constructed and sets on a wide spider with three-point support for ease of leveling.

TER
rdness
Cliff
Hard-
e first
weight
with
Vick-

Dead weights for applying loads of 1 to 1000 grams, and modern optical measuring equipment are supplied as standard equipment. For complete data, write:

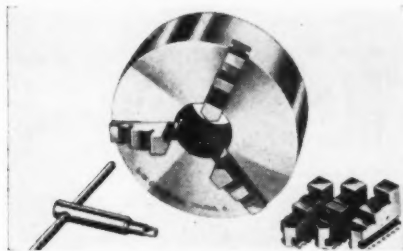
**Kent Cliff Laboratories, Dept. BB
Peekskill, N. Y.**

5" L-W UNIVERSAL CHUCK

A new 5-inch medium Universal chuck, with two sets of jaws, male and female, and wrench and featuring three separate pinions instead of the usual single pinion, has been announced by L-W Chuck Company. This chuck, illustrated, is a new addition to the regular L-W line of lathe chucks.

Easy to operate, the new chuck permits high accuracy and affords less wear on the ring gear. The body is a semi-steel casting with highly ground finish. The hardened jaws with ground steps assure a tight grip.

This new chuck can be used on any lathe having 1½"-8 thread spindle, including most models of Atlas, South Bend, Logan and Clausing manufacture.



By the use of a conventional back adapter plate, this chuck also mounts on any size and type lathe. It also fits and is ready for mounting on the L-W 6½" SD dividing head.

L-W Chuck Company also offers sturdy 6-inch and 8-inch independent 4-jaw chucks with reversible jaws, hardened and ground steps, and cast semi-steel body with ground finish, of the same quality as the larger size L-W chucks.

Literature will be sent free to anyone addressing the manufacturer.

**L-W Chuck Co., Dept. BB
23 S. St. Clair Ave.
Toledo, Ohio**

GEARS

Small and Medium

SPURS
(internal and external)
HELICALS
STRAIGHT
BEVELS
SPROCKETS
RACKS
WORMS
WORM
GEARS
THREAD
GRINDING



**COMPLETE
GEAR
TRAINS**

Send us your blueprints for estimate

**BEAVER
GEAR WORKS, Inc.
1033 Parmelee St., ROCKFORD, ILL.**

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DIAMONDS
FOR WHEEL DRESSING TOOLS

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DIAMONDS
FOR THREAD GRINDING TOOLS

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DIAMONDS
FOR ALL INDUSTRIAL PURPOSES

K K K K K K K K K K

KOEBEL

KOEBEL DIAMOND TOOL CO.
9456 Grinnell Avenue, Detroit 13

HIGH FREQUENCY ARC STABILIZER FOR WELDING OPERATIONS

A new circuit and a "remote control" now incorporated into the "Missing Link" Automatic Arc Stabilizer promise to reduce or eliminate most radio interference resulting from high frequency arc stabilized welders, according to its manufacturers, Mid-States Equipment Corp.

The usual high frequency circuit normally creates considerable RF interference during "idling" time due to the absence of grounding when not welding. The new circuit reduces RF radiation, and the new remote control automatically cuts off operation when the welding arc is broken. A switch, mounted on the electrode holder, is snapped on to resume operation. Elimination of idling also results in cooler, longer-wearing spark gap points.

The "Missing Link" Automatic Arc Stabilizer can be used with metal arc, gas shielded arc, carbon arc, Heliarc or spot arc welding processes. By automatically starting the arc, it eliminates the necessity of direct contact of the electrode with the workpiece to establish and maintain the welding arc. It also makes possible the use of any welding rod, a.c. or d.c. bare or coated.

For Heliarc and inert gas shielded welding processes, important optional

features of the improved unit are built-in gas and water valves and automatic control of gas afterflow to protect tungsten electrodes while cooling. No electric timing devices are necessary, but



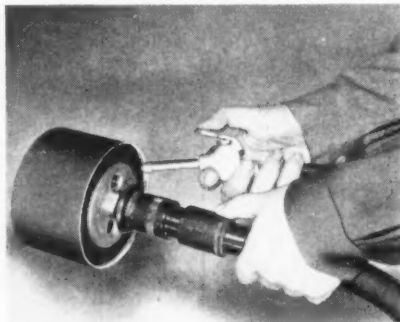
are available for spot arc welding. For complete information, write:

Mid-States Equipment Corp.

**2429 So. Michigan Ave., Dept. BB
Chicago 16, Ill.**

THE NU-MATIC GRINDER, A MULTI-PURPOSE POWER UNIT

A pneumatic rubber drum inflated at low pressures is the basis of the improved Nu-Matic Grinder, a new



power-wheel unit for grinding, sanding or polishing curved, irregular and contour surfaces. Made by Nu-Matic Grinders, Inc., the new unit can be used on bench, portable or flexible shaft motors.

Standard abrasive bands, 5" in diameter and 3½" wide in a variety of abrasive grits (24-500 grit) can be changed from roughing to finishing in a few seconds. Changes or replacements are accomplished by releasing the air and then reinflating to work requirements. The rubber drum provides a 100% grinding surface of the entire width of the abrasive band. The Nu-Matic eliminates grinder marks, covers work better, while extending the life of the abrasives. It serves

metal working, automotive, tool and die shops as well as glass, pottery, tile and general finishing.

The manufacturer explains that varied r.p.m. speeds, adjustable drum compression and the use of varied grit abrasives give the unit great flexibility and a wide variety of finishes. It is chatter-proof and is constructed for heavy duty and long life.

The manufacturers are making a special 20-day free trial offer without obligation to bona fide companies. Each Nu-Matic Grinder is provided with one adapter to fit $\frac{5}{8}$ "-11 or $\frac{1}{2}$ "-13 thread power shaft. Please specify size. Write on company letterhead mentioning this article, to:

Nu-Matic Grinders, Inc., Dept. BB
10304 W. McNichols Road
Detroit 21, Mich.

NEW LONGER LIFE CORE DRILL

An improved design core drill which eliminates one of the major objections to carbide tipped tools in core drilling operations is announced as standard equipment by Super Tool Company.

Wear strips of wear-resistant metal are brazed on the entire length of the flutes of the new Super Core Drill.



The addition of these wear strips eliminates the abrasive wear from cast iron chips on the body of the drill behind the carbide, and eliminates loading conditions which score the finished hole. The overall result is increased core drill life and superior hole finish, according to the manufacturers. Details and sizes supplied upon request to:

Super Tool Co., Dept. BB
21650 Hoover Road
Detroit 13, Michigan



10,000 MARKINGS ON TRUCK LEAF SPRINGS (Rockwell C-42)

For maximum life on ANY material your stamps should have the NEWCO bevel (Catalog # 5-46)

NEW METHOD Steel Stamps INC.

147 Jos. Campau Detroit 7, U. S. A.

NIELSEN Heavy Duty Live Centers

Write for catalog on live centers



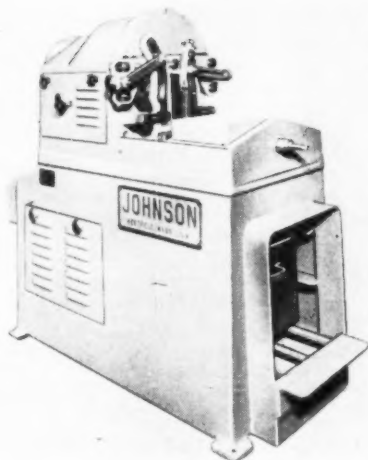
Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.

JOHNSON AUTOMATIC SCREW MACHINE PERMITS RAPID CHANGEOVER

Travel of forming arm, cut-off arm and stroke of drill spindle of this Johnson automatic screw machine is regulated by segment adjustment, so that machine change-over is accomplished in a few minutes. Positions of studs in segments or cross slides and drill arm determine throw, movement or length of tool travel. Cycle of operation varies from 1.5 to 60 seconds, and it is adjusted by simple substitution of cycle gears. Spindle speed can be varied by raising or lowering motor base.

Fractional horse-power motor drives the stock feed mechanism so that when collet opens, stock feed reel turns, winding in rope or cable attached to stock feed push rod. Tension required is directly proportional to stock size and can be varied instantly. Another feature of machine is chip and finished product removal. Parts automatically fall into tote pans located in machine base, and they are removed as often as necessary.



Standard equipment includes one collet, one drill holder and drill bushing, one tote pan, set of change gears, one

Beverly

THROATLESS SHEAR

- UNIVERSAL . . . makes intricate, angular, radii and straight cuts with equal efficiency.
- Positive rake produces neat, clean edges free of burr.
- Free-cutting . . . handles lightest material without distortion.
- Compound leverage . . . great power with little effort.
- High grade tool steel blades adjustable for wear. Easily replaced.
- B-3 Model (illustrated) has ballbearing hold down for easy control of heavier gauges. Beverly Shears also available with H.C.H.C. blades for handling Stainless.

See your Dealer . . . or write direct for information and illustrated Catalogs.

**The BEVERLY SHEAR
MFG. Co.**
3005 W. 111th St.
Chicago 43, Ill.

Made in 3 models to handle 14 gauge, 10 gauge and $\frac{1}{4}$ " Welded, all-steel stands available for Beverly Shears.

cut-off tool holder with cut-off blade, form tool holder, stock feed pipe and stand and stock feed push rod.

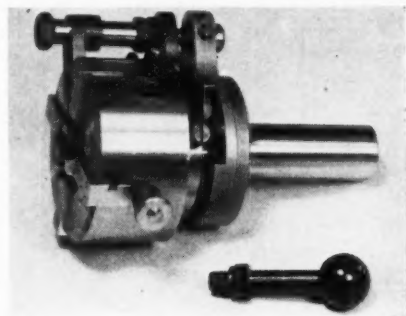
Write for complete information to:
Johnson Automatic Machine Co.
163 Elm St., Dept. BB
Westfield, Mass.

ALIGNING SHANK CONVERTIBLE DIE HEAD

Correct alignment between work spindle and die head chasers is essential in order to produce accurate screw threads. After a machine becomes worn, some misalignment usually exists. To compensate for this misalignment, The Geometric Tool Company has developed the new aligning shank, style DS, convertible, Self Opening Die Head, which has a built-in aligning shank. This aligning shank provides the means of quick centralizing of die head with work when machine misalignment exists. Its purpose is not, however, intended to minimize the importance of maintaining precise machine alignment.

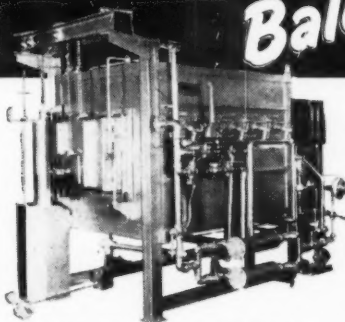
The new unit reduces overhang and maintains die head rigidity and initial machine capacity.

It is important that there is not the slightest misalignment when threading



small diameters of fine pitch, or in threading soft materials where the threads are apt to be shaved or have poor starts. By using the Geometric Aligning Shank DS Convertible Head,

Balco The New Controlled Carbon ATMOSPHERE FURNACE



The new Balco Furnaces provide clean, scale-free hardening, gas carburizing, and carbon restoration of plain and alloy steels. This is accomplished by the accurate control of the carbon potential of the atmosphere.

The Balco Furnace is a Standard-Rated, Gas-Fired Atmosphere Furnace of the muffle type with an integral RX atmosphere generator, and is available in three types—two for clean hardening and one for gas carburizing. Of the former, one type has a temperature range from 2000° to 2400° F, the other from 1400° to 1850° F. The range of the gas, carburizing, furnace is from 1400° to 1850° F.

The Balco Furnaces make available to the small furnace user a multiple-purpose unit for clean hardening, gas carburizing, carbon restoration and other carbon controlled heat treatments. One such Balco unit in operation in a large commercial heat treating plant has successfully processed 67 different grades of tool steel.

- MOST OPERATIONS
- LEAST INVESTMENT

Write for
full details
and
performance
figures.

2634G

'Surface' Standard Rated
FURNACES
SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

LUMA Soldering Tool



RESISTANCE TYPE

A proven tool for all soldering jobs large or small. Heats instantly—low maintenance. Safe to operate. Write for details.

LUMA ELECTRIC EQUIPMENT CO.
P. O. Box 132-H TOLEDO 1, OHIO

KEYWAYS A Foot A Minute With A MASTER CONVERTER



3 Sizes—For any Lathe 9" to 72" 1/2 to 1 1/2 H.P. Motors
Capacity: 1 Cu. in. Metal
Per Min. Per H.P.

BASIC MILLER and 7 Interchangeable HEADS THE MASTER LATHE CONVERTER

The world's most versatile auxiliary machine tool. Result of 14 years of designing, engineering and building multi-purpose milling and grinding attachments. Also does internal keyseating, drilling, reaming, boring, thread milling and hundreds of other metal working jobs.

MAXIMUM PERFORMANCE MINIMUM COST
Write For Descriptive Literature

MASTER MANUFACTURING CO.

1310 E. Avenue "A", Hutchinson, Kansas

it is possible to cut these accurately, thus saving the time required to realign the machine itself.

Alignment is made by loosening two square head screws at the rear of the head, allowing the head to float freely. A true running work blank is then threaded by slowly feeding head full length of thread to be cut. The machine is then stopped and the two square head screws are tightened. Die Head is then in proper alignment with work spindle.

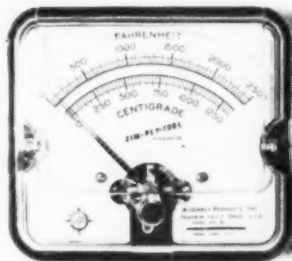
This new new Aligning Shank DS Convertible Die Head is available from stock up to ad including 3/4" size. For complete details and operational data, write:

The Geometric Tool Co., Dept. BB
New Haven 15, Conn.

INDICATING PYROMETERS HAVE WIDE HEAT RANGE

These new pyrometer indicators have dials calibrated in both Fahrenheit and Centigrade. Scales are over 3 inches long. Meter case measures 3 3/4" wide and 3 3/8" high and has clear plastic front.

These instruments are useful for measuring temperature in ceramic kilns, as well as furnaces and ovens, or in various types of baths. They are offered in several ranges for heat up to 2500° Fahrenheit and 1370° Centigrade.



Four ohms per millivolt give a high resistance of 212 ohms for 2500° Fahrenheit. Thermocouples do not need calibrated leads. Meters are calibrated

for 10 ohms external resistance, (8 ohms for 500° range). A suitable resistance spool, connected in the thermocouple circuit is brought out to an extra terminal on the back of the meter. With this in the circuit, thermocouples with uncalibrated leads up to 15 feet long are used. When longer leads are required this resistance is left out of the circuit. This will accommodate leads up to 100 feet long.

Alnico V-magnets with sintered iron poles provide the extra flux for the high torque movement. The moving elements ride on polished pivots in sapphire jewels and have phosphor bronze hairsprings. Instruments are accurately balanced and may be used in any position. They are fully compensated for ambient temperature. For complete specifications, write:

Assembly Products, Inc., Dept. BB
Main & Bell Streets
Chagrin Falls, Ohio

ADAMAS CARBIDE COMPARISON CHART

The Adamas Carbide Corporation has published a revised "Comparison Chart of Cemented Carbide Grades" which gives full information covering the equivalent grades of tungsten carbide manufactured by all established producers.

The chart shows: (1) type of material for which grade is suitable; (2) characteristics and uses; (3) approximate Rockwell hardness on the "A" scale, and (4) standard and special equivalent grades of manufacturers listed under appropriate classifications.

This information is all tabulated on an easily read form suitable for inserting into a three-ring notebook or posting on the wall. Copies of this chart may be obtained at no charge upon request to:

Adamas Carbide Corp., Dept. BB
1001 So. 4th St.
Harrison, N. J.

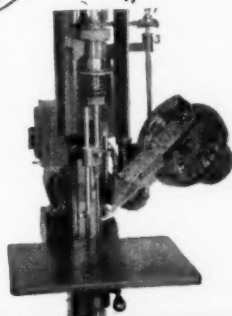


LADY MACHINE OPERATORS, You don't want to lose the charm and loveliness of your hands through cuts, scratches, dirt, resulting from the out-of-date hand method of driving screws . . . and **MANAGEMENT,** you don't want to make your plant a first-aid station. Eliminate all this by installing **DETROIT POWER SCREWDRIVERS**, the modern hopper-fed machines that do the dirty work without the hands coming in contact with the screws.

There are three models to drive screws from No. 2 to 5/8 at the remarkable speed of one a second. Send sample assembly for estimate.

WRITE FOR CATALOG.

DETROIT POWER SCREWDRIVER CO.

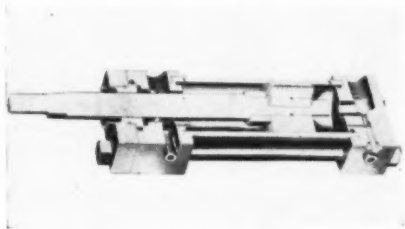


2809 West Fort Street,
Detroit 16 • Michigan

STANDARD 2500-3500 P.S.I. HYDRAULIC CYLINDERS

Both 10" and 12" bore, high pressure (2500-3500 p.s.i.) hydraulic cylinders are offered by Miller Motor Co., manufacturers of a complete line of air and hydraulic cylinders, accumulators, and related products.

According to the manufacturer, this is the first time cylinders of this size and power have been put in volume production and offered in standard



models for quick delivery. This standardization and immediate availability in many cases, eliminate the costly special designing and manufacturing generally required for cylinders of this type. The new Miller 10" and 12" mod-

els are available in single and double rod end styles, and in a choice of piston and piston rod seals for different applications, including the automotive step-cut Miller piston ring piston seal and the leakproof, low friction Miller piston cup piston seal, which are interchangeable on the same piston rod.

The illustration shows a cut-away view, showing the standard Miller design features employed in the construction of these 10" and 12" hydraulic cylinders. The automotive step-cut Miller piston ring seal is optional.

The cylinders conform to the J. I. C. Hydraulic Standards for Industrial Equipment. They are equipped with non-breakable solid steel heads, caps, and mountings, hard chrome plated piston rods, replaceable dirt wiper seals, and other features as described and illustrated in Miller Bulletin H-104. The cylinders are inspection-tested at 5000 p.s.i. For more information, write:

Miller Motor Co., Dept. BB
4027 N. Kedzie Ave.
Chicago 18, Ill.

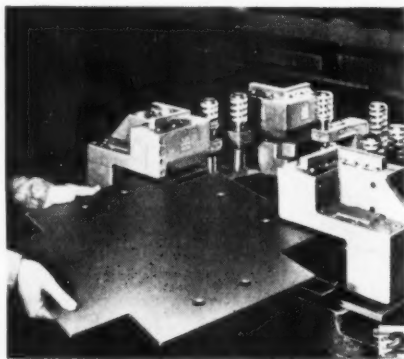
HEAVY-DUTY STEEL NOTCHING UNITS

Announcement is made of a new heavy-duty Wales Type "NJ" Notching Unit by the Wales-Strippit Corporation, specialists in punching and notching equipment. These new Notching Units provide a maximum 5" x 5" 90° corner notch in metal up to 1/4" thick mild steel. Wales Type "NJ" Notching Units have the same shut height as Wales Type "CJ" Hole Punching Units, and may be used in combination setups to punch and notch mild steel up to 1/4" thick, in the same operation.

The self-contained design permits the same group of Notching Units to be used in unlimited setups in stamping presses and press brakes. Each unit is mounted independently, which provides quick setups according to varying patterns. These heavy-duty Notching Units can be easily set up according to pattern. Such setup flexi-

bility keeps tooling investment in practically continuous productive operation.

All parts, such as punches, dies and punch lifter springs are built into the



self-contained holder, thus, the punches and dies are kept in permanent alignment, eliminating time-consuming adjustments required to align conventional notching dies.

With these Wales Notching Units, the press ram has only one function—to depress the punch. The punch is not attached to the press ram.

Complete setups, ready to operate may be made outside the press on T-slotted plates or templates. This allows setups to be moved onto the press bed and to start production with the first down stroke of the press ram. Interchanging different setups in and out of the press at the end of long or short production runs keeps the press in practically continuous operation.

The illustration shows a set-up of heavy-duty Wales Type "NJ" Notching and Type "CJ" Hole Punching Units set up on templates in a stamping press. These same units may be set up on T-slotted plates in stamping presses and on "Strip" templates, T-slotted plates and rails with adapters in press brakes. Note the 1/4" thick work in foreground produced by the combination punching and notching setup.

For complete information on these new heavy-duty Notching Units, write:

**Wales-Strippit Corp., Dept. BB
North Tonawanda, N. Y.**

COMBINATION FORK AND BOOM TRUCK ATTACHMENT

A recent materials handling development, whereby one truck is adaptable to different kinds of load-handling operations, has just been announced by Elwell-Parker Electric Co. This simple device can easily be converted from the fork to the boom; the truck's driver can change from one to the other in a few minutes without the need of special tools.

The attachment is useful in metal working plants and others where loads are heavy and vary in shape and size, as well as in lighter industries generally using fork trucks but occasionally having need for moving goods or

under the surface

OF YOUR WORN CUTTERS

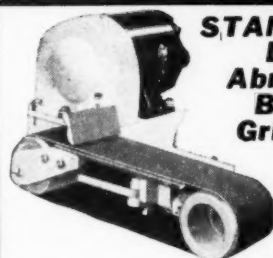


RUTLAND TOOL SERVICE can uncover important savings for you through recutting worn tools to original spiral and tooth form. Replacement of carbide tips especially on multi-tipped round tools will effect a definite saving in your tool costs.

Send for Literature and Prices.

RUTLAND TOOL SERVICE

13006 Greeley, Detroit 3 TOWNSEND 8-1661



STANDARD D-4 Abrasive Band Grinder

Famous
for
Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre... at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood 4x36 1/4" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

306 E. 38th St., New York 16, N. Y.

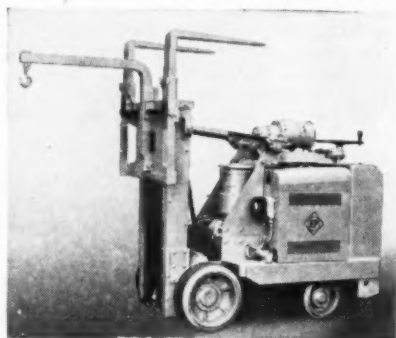
equipment better carried by means of a rope or cable sling suspended from a boom. Both fork and boom can be used together for some jobs requiring extra security in handling.

The device consists of a base member which is attached to the truck's lifting mechanism and which rides in the upright tilting columns; the fork tines suspended from a bar supported on the base; and the boom, which is a solid, alloy-steel heat-treated bar bent at 90° near the middle of its length. That part which engages the base is machined for a sliding fit into brackets and a base socket where it is held vertically and firmly in place.

When forks are to be used alone, the boom is detached by slipping it out of its holder. When boom is required by itself, the fork tines are swung upward and backward and held in this position by means of pins in the brackets at top of the back-base. Tines clear truck mechanism at any working height.

The boom in the model illustrated

extends 36" horizontally from the base. Fork tines are 36" long. Maximum height of lift of boom hook from floor is from 30" to 145". Maximum height



of fork is 117". The truck's rated capacity is 4000 pounds. For additional information, write:

Elwell-Parker Electric Co.
4018 St. Clair Ave., Dept. BB
Cleveland 14, Ohio

3 steps ahead with 3 kinds
PRECISION VELVET FINISH

MARSHALL GROUND FLAT STOCK

WATERcrat

OILcrat

AIRcrat

READY FOR THE LAYOUT BENCH
for dies, jigs, fixtures, templates

MARSHALL STEEL CO.
LISLE, ILLINOIS

441 STANDARD SIZES
READY FOR SHIPMENT
WRITE FOR NEW CATALOG

BOX NO. 588

The ARISTOCRATS of
GROUND TOOL STEEL

base.
imum
floor
height

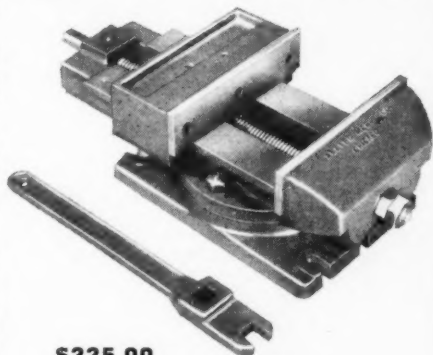
ALLIED Heavy Duty VISE

Designed and constructed for handling tough production jobs.

Screw extends thru both ends of vise and is fitted with a thrust bearing nut behind a stationary jaw. This unique arrangement provides greater clamping action on the work being held.

Base is accurately graduated in degrees, and may be furnished solid without slots to accommodate mounting on any machine.

Can be used on millers, shapers, grinders and drill presses.



SPECIFICATIONS

Opening of jaws	13"
Width of jaws	12 5/8"
Depth of jaws	3 1/4"
Overall Length	24 1/4"
3 slots in both end of base with	3 3/4" centers
Approx. weight	260 lbs.

\$225.00
PROMPT DELIVERY

ALLIED MACHINERY CO.

548 W. Monroe St.,

Chicago, Illinois

Inspection Time Reduced 99%

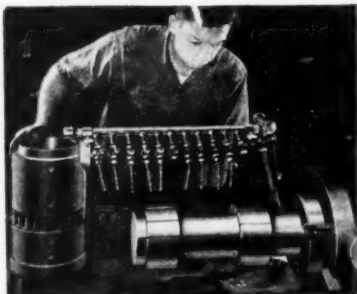
Set-Up Time Cut!

**ERICKSON EXPANDING MANDREL HOLDS
.0005" ACCURACY FOR 11 SIMULTANEOUS
OPERATIONS — WITH ONE SET-UP**

Manufacturer previously had great difficulty holding concentricity within .0005", and work required 100% inspection. Today, with Erickson mandrel on the job, this manufacturer writes, "Now save 99% of inspection time . . . rejects have been cut to practically nothing. Concentricity is no longer checked, and is well within your .0005" guarantee of accuracy."

Simplicity of operation cuts set-up time, too. No forcing pieces off or on. A touch of the controls and the mandrel is instantly collapsed or expanded! Famous Erickson double-angle principle insures uniform, positive gripping power through entire surface of mandrel. This gives concentricity and holding power never before equalled by any mandrel.

Erickson mandrels have been adapted to solve many tough ID holding problems, such as holding motor stators for machining opera-



tions. Why not find out today how the Erickson Mandrel can handle your internal holding job!

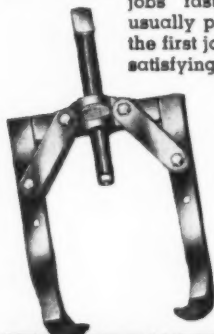
Ask for Catalog T-2 or Erickson Engineer

ERICKSON TOOLS DIVISION

2300-B Hamilton Ave.
Cleveland 14, Ohio

ARMSTRONG - BRAY Gear and Wheel Pullers

These powerful service tools Pull gears, wheels, bearings and bushings from shafts, easily and quickly. They eliminate pounding, battering and breakage of vital machine parts. They make tedious and risky jobs fast and safe. They usually pay for themselves in the first job, and give years of satisfying service.



12 types, 40 sizes (including special designs for special application) with Drop forged arms and heat treated forcing screws.

Write for circular
ARMSTRONG BRAY & CO.
5364 Northwest Highway
Chicago 30, Ill.



PORTABLE ELEVATING TABLE



**Saves
TIME
and
LABOR**

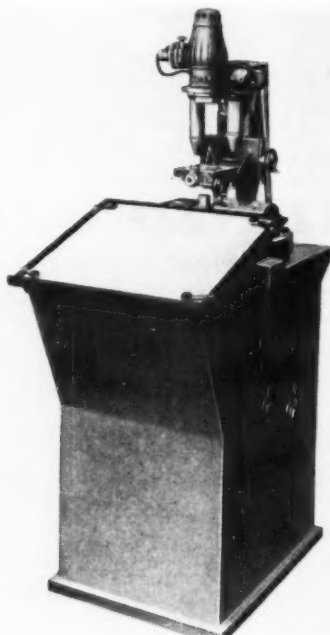
Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height up to 15½", leaving operator's hands free. Table swivels and locks in any position.

SEND TODAY FOR ILLUSTRATED
CATALOG NO. 2

MIDWEST TOOL & ENG. CO.
112 WEBSTER ST., DAYTON, OHIO

PROFILE PROJECTOR HAS WIDE RANGE OF APPLICATIONS

Manufacturers of machines, tools and precision devices are offered a Profile Projector that can be used easily and quickly for checking and measuring at different magnifications and illuminations. It is now available from Hauser Machine Tool Corp., direct and exclusive U.S. factory representative of Henri Hauser, Ltd., Bienne, Switzerland.



The interchanging of parts for magnification or illumination purposes is eliminated; all optical parts are built in. Simply by twisting the turret lenses, the desired magnification snaps into position. The magnification slide also snaps automatically into place in alignment with the turret lenses.

Another feature is the luminosity and sharpness of the image, right into the corners of the screen. The luminosity

is so strong that surface areas show clearly under episcopic illumination on 50 and 100 magnifications. The exceptional luminosity permits examination and checking of the surfaces of opaque objects.

An extensive range of applications is possible. Widely diverse pieces can be checked and measured easily and quickly.

The condensers are firmly built in a condenser head, and correct illumination is chosen by a single turn of this head. A suitable condenser is provided for each magnification, insuring a maximum of light over the whole screen. The condensers produce a parallel beam of light on the objects and small focusing errors are therefore of no consequence for the accuracy of measurements. The episcopic illumination for all four magnifications is simple to operate.

The reading accuracy on the screen is approximately .004-.008" which, at a magnification of 100X, corresponds to an error on the object of .00004-.00008".

The unit comes complete with objectives for magnification of 10, 20, 50 and 100X. For complete description of the P-215 Profile Projector, with accompanying accessories, write:

**Hauser Machine Tool Corp., Dept. BB
Manhasset, N. Y.**

GEAR LAPPING COMPOUND DEVELOPED

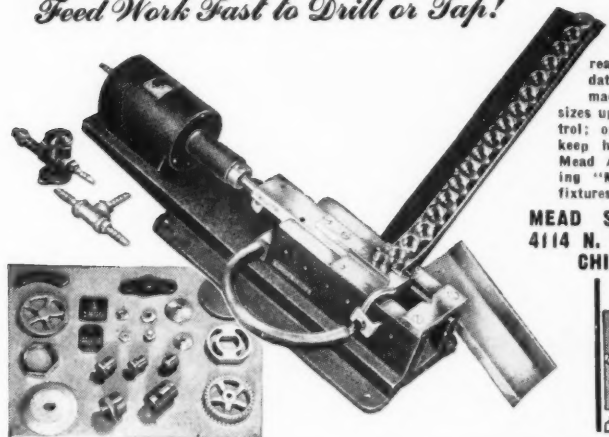
An oily paste base abrasive compound has been developed by United States Products Company for fine finishing of all types of gears. It can be applied with a brush or paddle and will adhere to the gear teeth while in work. This compound has application not only for new production finishing, but also for quieting or removing vibration from existing gear installations.

The manufacturer will send samples for test purposes to those writing on a company letterhead. Specify size of gears, face and diametrical pitch and hardness of metal. Address requests to:

**United States Products Co.
518 Melwood St., Dept. BB
Pittsburgh 13, Pa.**

Boost Output with MEAD WORK FEEDERS

Feed Work Fast to Drill or Tap!



As - fast - as - you -
can - step - on - a -
button the sensational
new Mead pneumatic WORK-
FEEDER delivers, holds,
ejects small parts to be drilled,
reamed or tapped. Accommo-
dates stampings, castings, screw
machine parts, etc. Adjustable to
sizes up to 3". Foot or automatic con-
trol; operator's left hand is free to
keep hopper loaded. Write for new
Mead AIR POWER Catalog describ-
ing "Mead Family" of air operated
fixtures and devices.

**MEAD SPECIALTIES COMPANY
4114 N. Knox Ave., Dept. YA-49
CHICAGO 41, ILLINOIS**

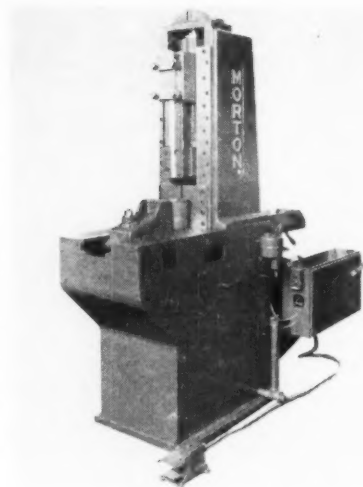


MORTON VERTICAL FLASH TRIMMING MACHINE

This Morton Flash Trimmer is used in removing the flash from butt welded small motor frames and other cylindrical parts. It has a capacity of 4½" minimum to 9" maximum diameter, 8" length of stroke and stock thickness up to ¼" maximum. It is hydraulically operated.

The base of the machine contains the hydraulic fluid and operating valves. The upper column provides machined guider bearing surfaces which form the guiding path for the vertically movable cylinder and tool carriers. The cutting cylinder is of special design, being made with generous rectangular bearing surfaces, cast integral with the cylinder housing. The lower cap of the cylinder contains the special relieving clapper box type of tool holder which is provided with horizontal adjustment for positioning the cutting tool in relation to the work clamping dies.

A cutting speed of 50 ft. and return



speed of 100 ft. per minute is provided. The work holding and clamping fix-

SAVE TIME
on intricate, angular
SET-UPS

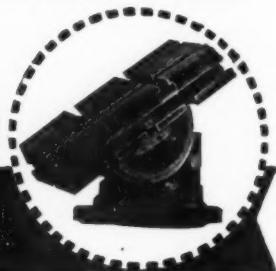
Multi-Swivel **WISE**

Fully universal . . .
three swivels simplify the
setting of compound angles.
Parts interchangeable . . . can
be used as a plain flanged vise,
a swivel vise or multi-swivel vise.

Write for
name of
nearest distributor



The Platen increases capacity of the unit.
Vise and Platen are interchangeable.



MASTER TOOL CO.

67 BATTERYMARCH ST. • BOSTON, MASS.

ture is hydraulically operated. It may be adjusted toward or away from the back clamping dies to take care of variation in work diameters. Automatic operation of clamp, cut, return and unclamp is provided with foot pedal control.

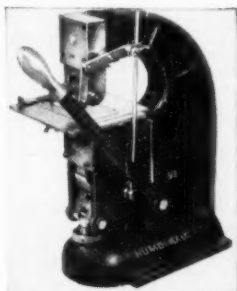
Suitable trimming accuracy and capacity equal to welding production is provided with this new vertical flash trimmer. For complete specifications, write:

Morton Manufacturing Co., Dept. BB
Muskegon Heights, Mich.

BENCH HAND TOGGLE PRESS

An ingenious and useful Bench Toggle Press, manually operated, for numbering, marking and stamping, has been introduced by Numberall Stamp & Tool Co. The press, designated as Model 93, has been designed for use with the manufacturer's Automatic Numbering Head, Model 50, used for consecutive numbering. The new press is especially useful for stamping serial num-

bers on name plates, and similar operations. Non-automatic numbering heads, typeholders and steel type can also be used in the new toggle press.



The new unit exerts a pressure up to ten tons. The head space is adjustable to size opening desired by operator. For complete information and specifications, write the manufacturer:

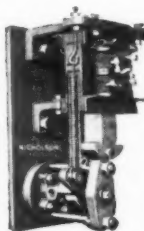
Numberall Stamp & Tool Co.
Huguenot Park, Dept. BB
Staten Island 12, N. Y.

Nicholson CUSTOM Construction Enables You to

Choose a Valve to Suit

Your Specific Corrosion or Pressure Problem

Choice of 6 metal combinations. Other Nicholson features: specially treated hard seats; easily re-packed; heavy-bodied; neat, installed in any position. For all mediums. Press. to 5000 lbs. CATALOG 546.

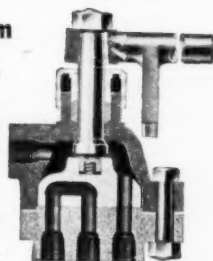


Types for Most Operating Purposes

Lever models, $\frac{1}{4}$ " to $2\frac{1}{2}$ ", press. to 5000 lbs. Motor, solenoid and foot models. $\frac{1}{8}$ " to $2\frac{1}{2}$ ", press. to 375 lbs.

W. H. NICHOLSON & CO.

117 OREGON STREET, WILKES-BARRE, PA.



Steam & Air
Traps
Control Valves
Expan. Mandrels
Arbor Presses
Welded Floats

TO INCREASE PRODUCTION AND TO IMPROVE
EFFICIENCY USE

BUTTERFLY FILING AND DIE MAKING MACHINES

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Aluminum Plants, Toolrooms where fast production is desired. 4 Models, No. 16, No. 14 "EL" and Model "D." The larger the Model, the bigger the stroke and therefore more filing is performed. Furnished with or without pedestals.

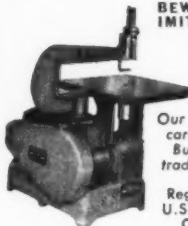
Constructed as per specification of U. S. Naval Aircraft Factories.

HARVEY MFG. CORP.

161 Grand St., New York,

Phone Canal 6-5170

BEWARE OF
IMITATIONS



Our machine
carries the
Butterfly
trade mark.

Registered
U.S. Patent
Office

LUCIFER...

ELECTRIC HEAT- TREATING FURNACE

MODEL—DL 7052

Set the dial . . .
throw the switch,
that's all! The fur-
nace climbs to
predetermined
temperature.
Climbs to 1600° F
in 40 minutes . .
2000° F in 72 min-
utes. Contains over
1725 cubic inches
of muffle. Complete
with Lucifer 100%
automatic electronic
control. Muffle size
is 12" wide, 12"
high, 12" deep.



\$570

SATISFACTION GUARANTEED

Some territories open for distributors.

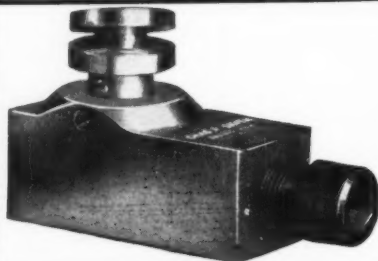
GILBERT S. SIMONSKI

401 N. Broad St., Philadelphia 8, Penna.

TWO NEW PARAGON AIR PRESSES

Paragon Metal Products recently announced two new Air Presses designed to increase production on staking, press fit assembling, light stamping, marking, and similar repeated operations. The new units, designated as Models AP-1 and AP-2, feature a guided ram which prevents rotation, and assures accuracy by maintaining a fixed relative position to fixtures mounted on the press' base. The presses also feature instant ram return, which permits more rapid consecutive operations. A built-in head quick exhaust for instant ram return designed for high speed operation, where faster than normal ram return is desired, can be supplied at customer's option for an added amount. A 4-inches long bearing resists side thrusts; a base equipped with a large ground surface area facilitates fixture mounting.

Also featured is a full 6-inch throat depth. The press body, of sturdy two-



Charles F. Smith & Company

Manufacturers of

"SET-UP-JACKS"

(packed 4 to a set)

These jacks are used in setting up work on any machine where accuracy is necessary and saves 75% in time. Extra cap for angles will take 15 degrees. Have been tested, will raise 2000 lbs. (ea.). Have a large base so will not tip. These are hardened throughout. Easily adjusted with a standard Allen wrench. A great time saver in Pattern shops and Tool and Die Rooms.

Write for literature and prices.

Charles F. Smith & Company

1723 E. Main

Owosso, Michigan

piece construction permits the user unlimited extension of table to ram height.

The Model AP-1 has a cylinder with a 4" bore and a power factor of 12.56 times line pressure; the Model AP-2 has a 5" bore cylinder, and a power factor of 19.63 times line pressure. A



2½" stroke, ¾" ram, 6" throat depth, and 7" table-to-ram height are common to both models. For complete information, write for specification sheet to:

Paragon Metal Products, Dept. BB
844 W. Adams St.
Chicago 7, Ill.

Save

**TIME, SPACE &
MACHINE TOOL
BEDS WITH**



OLD WAY



NEW

**PO-RO
Clamp
Support
Blocks**

½" to 10" height (in ⅛" adjustments) with one set of blocks.

**HARDENED STEEL
TRUE FLAT SURFACES
SLIP-PROOF SERRATIONS**

\$8.75

a set consisting of:

- 4—No. 1 half blocks — ½" to 1"
- 4—No. 2 half blocks — 1" to 2½"
- 4—No. 3 half blocks — 2½" to 6½"

PODLIN TOOL CO.

3920 Wesley Terrace, Schiller Park, Ill.

VIS-U-LINE CENTER PUNCH

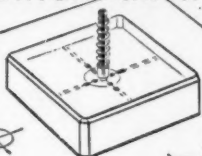
Easily locate centers on layouts by placing the transparent Vis-u-line on the cross-line and tapping punch. Broken double cross-lines insure instant accuracy.

\$2.25

C.O.D. plus postage

SEE YOUR DEALER
OR ORDER DIRECT FROM

UNICO, Huntington, New York



SOMETHING NEW . . .

TRUE CENTERS TRANSFERRED Instantly
WITH UNIVERSAL TRANSFER PUNCH

No Layout, Measuring or Scribing required—Automatically centers and squares itself with finger tip pressure
(3 Sizes: ⅛ x ½", ⅜ x ¾" and ½ x 1")

Tool Specialty Salesmen Wanted

Universal Transfer Punch, Inc.

Dept. H., Box 412,

Massillon, Ohio



CARBIDE ADJUSTABLE THREAD RING GAGES

For long production runs, where day in and day out accuracy must be maintained, Pratt & Whitney, Division Niles-Bement-Pond Co. can furnish their exclusive new Go and Not Go Carbide Dualock Adjustable Thread Ring Gages. These gages eliminate the hazard of gage wear on close tolerance work. They are also useful as master or reference gages due to their long wearing qualities and stability.

The new P & W Carbide Dualock Adjustable Thread Ring Gages are adjustable because they have the same A.G.D. locking mechanism as steel rings; they are relieved at the major diameter to preclude the possibility of interference, thus assuring the required contact on the thread flanks but not on the crest or root.

The gages are convoluted on both ends to remove partial threads up to the start of the full thread. They are precision lapped to remove grinding marks and irregularities on the thread

flanks. P & W Precision Lapping corrects variation in thread angle and produces a uniform smooth surface over the entire thread flank.



These Thread Ring Gages are claimed by their manufacturer to outwear fine steel thread rings, thus eliminating frequent inspection and replacement. For complete specifications, write:

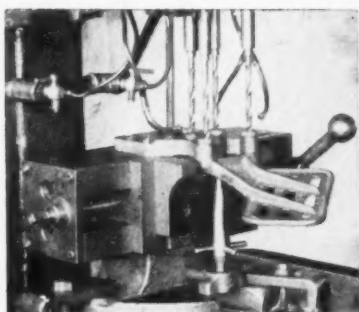
Pratt & Whitney, Dept. BB
Div. Niles-Bement-Pond Co.
West Hartford 1, Conn.



Designed for modern production requirements. Saves time, effort and motion. Has a two way micrometer adjustment with locking device to assure absolute cutting accuracy.

Kutmore Hollow-Mills may be had with straight or taper shanks, high speed or Carbide Tipped blades. Insist on Kutmore for accuracy, speed and economy. Prompt delivery. Write for Catalog No. 15.

Carl Wirth & Son
1625 CLINTON AVE. N.
ROCHESTER 5, N. Y.



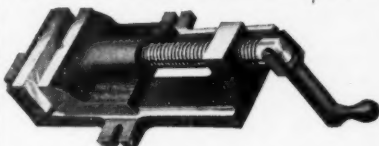
JOHN'S DRILL JIGS

One of the many jobs to be done on the Johns 14" Jig.

HEUSER MFG. CO.

1638 N. Paulina St. Chicago 22, Ill.

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY

1335 SO. MAIN STREET
MEADVILLE, PENNSYLVANIA

FREE TRIAL OFFER

now available on the

TORNADO*

Industrial Vacuum Cleaner

FAST—Does thorough cleaning —
Stands up in severe service —
SALVAGES fallen metal parts.

Now used throughout industry and is the choice of plant maintenance men on the basis of performance.

That is why we want you to test it in your own shop or plant and judge its value to you. Write today for complete details.



*Trade Mark
Reg. U.S. Pat. Off.

BREUER ELECTRIC MFG. CO.

5128 Ravenswood Ave., Chicago 40, Ill.



For precision punching of shim stock up to .025, also rubber, fibre, paper and plastic, the new **TRANSPARENT Shim Stock Punch** provides an easy and economical answer.

ACCURATE ALIGNMENT is assured because the clear plastic top enables the operator to actually see the work. Overall size: 1½" x 3" x 3½", which provides for the following standard size holes: ⅛", 3/16", ¼", 5/16", ¾", 7/16", ½", ⅝", and ¾". Special sizes built to your specifications. Write today for full details . . . and begin to enjoy the advantages which only the **TRANSPARENT Shim Stock Punch** can give your plant.

ALLIED TOOL & DIE CO.

305 N. Baum St., Saginaw, Mich.

KENT-OWENS MILLING MACHINE WITH ROTARY TABLE

A Kent-Owens No. 2-20 Milling Machine has been equipped with a hydraulically controlled rotary table 16" in diameter, replacing the standard table. The rotary table is driven by means of a gear and rack mounted at the rear of the fixture. The rack is actuated by a hydraulic cylinder. The desired cycle can be obtained by placing the dogs in the proper position on the outside of the rotary table.

The machine has twelve spindle speeds ranging from 64 to 860 r.p.m. The drive is simple and direct, with only two gear contacts from motor to cutter. The drive is taken from a standard foot mounted ball bearing motor, at the rear of the machine, and passes vertically through a splined drive shaft, worm and worm gear, then through pick-off gears directly to the cutter. The head is mounted on two cylindrical ground steel posts, which carry the spindle midway between them—a feature which provides rigidity without



overhang and with no possibility of cocking action. For complete specifications, write:

Kent-Owens Machine Co., Dept. BB
Toledo, Ohio



New improved design—welded steel body—4½" dual insulation—uplifting counter-balanced door—heavy duty element embedded in all four sides of heating chamber.

TEMCO

It's new

SERIES 1600 ELECTRIC FURNACE

FOR HEAT TREATING TOOLS,

DIES, PARTS AND GENERAL LABORATORY WORK

New fast-heating sturdy TEMCO model built for continuous use to 1650°F., intermittent to

1900°F. Supplied with either 500

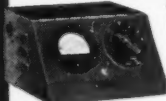
series TEMCOMETER stepless

temperature controller and

indicator (illustrated) or with

VERITRON electronic con-

trolling pyrometer.



MODEL	CHAMBER W" H" D"	VOLTS 50, 60 CY.	WITH TEMCOMETER	WITH VERITRON
1625	5 x 4½ x 9	115	\$140.00	\$262.50
1620	5 x 4½ x 9	230	142.50	262.50
1635	5 x 4½ x 13½	115	167.50	280.00
1630	5 x 4½ x 13½	230	170.00	280.00

Write for literature and dealer's name.

THERMO ELECTRIC MANUFACTURING CO.

486-4 W. Locust St., Dubuque, Iowa

LOW COST LOCATING BY CENTER SCOPE

**Dependable
Accuracy.**

Ample Adjustment

For Spindle
Run-Out.
For
Drill Presses,
Lathes, Mills.

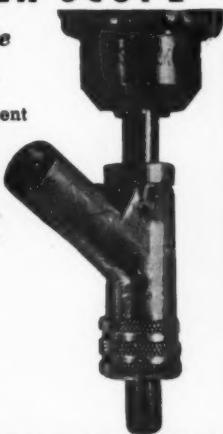
SERIES "M"

\$24.50

CASE EXTRA

\$3.50

Bulletin M-8
CENTER SCOPE PRODUCTS
3829 San Fernando Rd., Glendale 4, Calif.



ARTUS ARBOR SPACERS

**The COLOR tells
the THICKNESS**



ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

CONVENIENT TRIAL OFFER

Handy Spacer Assortment

10 ea.	.001 — .0125 thick
5 ea.	.015 — .030 thick

100 SPACERS IN ALL

$\frac{7}{8}$ "	— \$3.10	$1\frac{1}{4}$ "	— \$3.80
1"	— 3.35	$1\frac{1}{2}$ "	— 4.70

Other standard sizes also available.

**Illustrated Folder Free.
Immediate Delivery on
Spacers, Gaskets, Shims**

INDUSTRIAL PRODUCTS SUPPLIERS
434 Broadway New York 13, N. Y.

OUR EFFICIENT TOOL DESIGNING

*means
better production
at a lower cost*

Efficient tool designing in post-war's competitive production is a "must". Our experience guarantees you tools — designed for economy of operation, resulting in your increased production at lower costs.

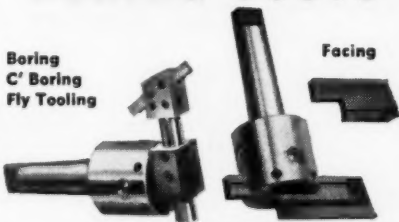
COLUMBUS DIE TOOL
and Machine Co.

930 CLEVELAND AVE., COLUMBUS 10 OHIO

CUT BORING COSTS

Boring
C' Boring
Fly Tooling

Facing



BLIND HOLE BOTTOMING

Many enthusiastic users report that the Behr Boring Bar actually pays for itself in the first four weeks of operation. Just ask the man who uses one.

This new patented bar is chatter proof, extremely accurate and ultra efficient. Has interchangeable blades and accessories.

It is unequalled for versatility and efficiency.



Trade Mark

**Can You Afford
NOT to Get the Facts?**

WRITE FOR CATALOG TODAY

BEHR

Products Company
Warren, Michigan

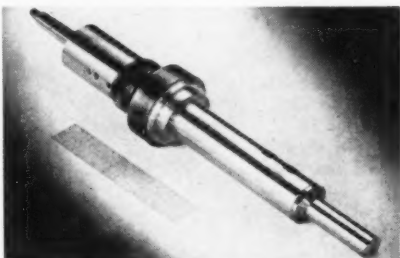
LARGE-SIZE AUTOMATIC RECESSING TOOL

The Maxwell Company has announced a new large-size automatic recessing tool designed especially for use on radial drills, boring mills and large boring machines, as well as drill presses. The new tool employs the same standard Max-Well rack and gear operating mechanism as used in the smaller tools of the same line, (see February Machine and Tool Blue Book, p. 266) and this large size recessing tool can be used in conjunction with comparatively heavy machines to recess internal forms normally considered inaccessible for standard equipment.

Because of the ball bearing loaded pilot feature, the new tool can be used in conjunction with existing fixtures. If fixtures are not used, tool collar will stop on the workpiece surface to locate the cutters and the subsequent recesses. Cutter bits can be positioned to meet individual specifications, and with this new tool, cutters can be located for cutting deep recesses in re-

lation to the workpiece outer surface.

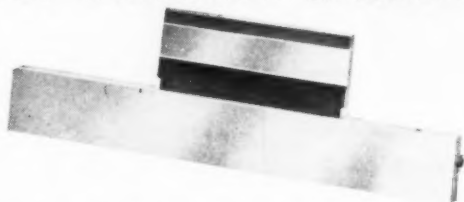
Cutter feeds can be furnished in a ratio of approximately 1:3 as compared to the spindle speed. Individual cutters can be made of either high-speed



steel or carbide tipped, depending upon user's specifications. For complete data, write:

**The Maxwell Co., Dept. BB
220 Broadway
Bedford, Ohio**

X-L WORK REST For Centerless Grinders



Replaceable blade work rest holder consists of master holder, wedge lock, & blade. Blades furnished in **cast iron, or tipped with X-L hard metal or carbide.** Also lengths & widths to your specifications.

Remember—when worn out, only the blade has to be replaced.

Write for latest catalogue & Price list.

ESCO ENGINEERING CO.

**13413 EUCLID AVENUE
CLEVELAND 12, OHIO**

**Dealers: Some
territories still open.**

WORK RESTS FOR CENTERLESS GRINDER

The Esco Engineering Company introduces the X-L Line of Work Rests for Centerless Grinders. This line consists of both holder and blade assemblies for in-feed work and solid pass through blades for through-feed work.

The assembly for in-feed work consists of a master holder, wedge lock and replaceable blade. The wedge lock locks the blade in the master holder and when the blade is worn out, only the blade itself need be replaced. Different length blades can be used in the same holder. These replacement blades are available in standard widths and lengths; specials can be furnished to customers' specifications. They are furnished in cast iron for fine finish work, tipped with X-L hard metal for semi-finish work and carbide for rough work. Other material can be furnished to customers' specifications.

The main feature of this blade is that when it is worn out, the blade only need be replaced rather than the whole

assembly. The assembly takes the place of the solid piece ordinarily used in this type of work.

Solid pass through blades are furnished in the same materials and standard widths and lengths. Both solid pass through blades and replaceable



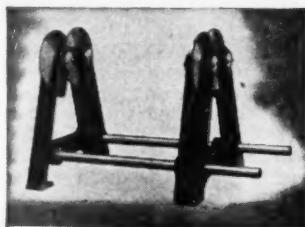
blades for in-feed work are furnished for various types and sizes of centerless grinders. For complete data, write:

Esco Engineering Co., Dept. BB
13413 Euclid Ave.
Cleveland 12, Ohio

If you handle Rotating Parts

If your shop handles rotating parts these sturdy and dependable balancing ways would be highly profitable equipment to use. In accurate balancing and truing operations they save time, labor and money. No leveling required.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.



ANDERSON BALANCING WAYS

Swing	Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Write For Bulletin No. 4-5

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Rota Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

MEDIUM-DUTY DUSTKOP DUST COLLECTOR

Designed especially to collect dust, dirt and lint from medium duty grinding, buffing, polishing operations, and shavings and sawdust from middle sized belt and disc sanders, the Model 800 Dustkop is added to its line of unit type dust collectors by Agat-Detroit Company.



The new unit is self-contained, portable and may be installed without wall or floor cutting or duct work. It develops a rated suction of 746 c.f.m. at 8,000 f.p.m. velocity, with 3.7" water lift. Its principle of operation consists of a paddle-wheel type, self-clearing

fan, direct driven by a continuous duty, $\frac{3}{4}$ h.p., 3600 r.p.m. motor, which creates the suction to remove the dust from the source. A cyclone separator, self-contained within the unit removes the majority of the dust and dirt from the air stream, allowing only the extremely fine dusts to be trapped by the spun glass filter which forms the top of the unit and comprises a second stage cleaning for the air before it is recirculated to the working space to save heat.

Dust removed from the air stream in the cyclone is deposited in the drawer of the dust collecting bin which forms the base of the unit. The fine dusts which are removed by the non-inflammable spun glass filter are shaken out of the filter by a hand crank.

Compactness (20" x 30" floor space x 30" height) permits the unit to be installed immediately behind or close to the source of the dust. Inlets sized for connection with standard sheet metal pipe or flexible metal hose are optional as follows: Single 6", single 5", double 4".

The suction developed by this unit permits its use with double-end tool grinders with wheels to 10" diameter, polishers and buffers, belt and disc sanders to approximately 8" diameter. Actual sizes vary, and should, of course, be analyzed individually. Write for further information to:

Agat-Detroit Co., Dept. BB
Main at Washington Sts.
Ann Arbor, Mich.

'STAR DUST'

LABORATORY GRADED
PURE DIAMOND POWDERS

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- Absolute control of particle sizes
- Complete absence of out-size particles
- STAR DUST sizes as fine as .0001"
- Complete range of grit sizes

There is a STAR DUST Field Serviceman in your territory.

ACE ABRASIVE LABORATORIES

ONE SPRUCE STREET
NEW YORK 7, N. Y.

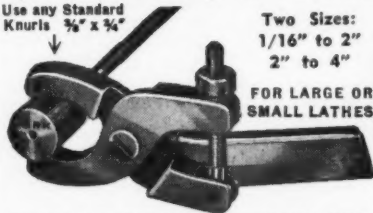
STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .0000004 of an inch.

**Precision LAPPING
POWDERS for
PRECISION work**



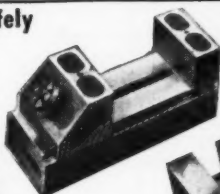
KNURL it Easily, Quickly, Safely

Use any Standard Knurls $\frac{3}{8}$ " x $\frac{3}{4}$ "

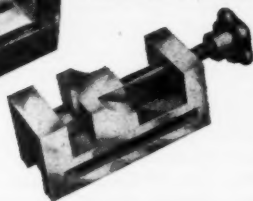


Two Sizes:
1/16" to 2"
2" to 4"

FOR LARGE OR SMALL LATHES



TOOLMAKERS' PRECISION VISES



6 Sizes

Priced To Sell

Joseph B. Fakes & Co., Royal Oak, Mich.

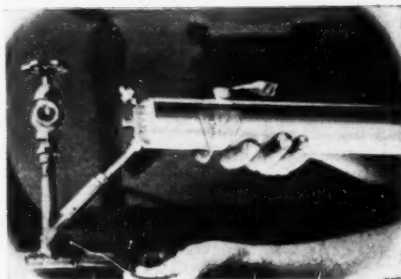
THE TORCHMASTER, USEFUL SELF-CONTAINED HAND TORCH

The new I.C.C. approved Torchmaster is a general purpose, self-contained hand torch using liquid petroleum gas (Butane, Propane, etc) as fuel. It has a filtered "Wind-Pruf" tip which produces a variable sootless flame useful for light brazing, all types of soldering, and innumerable heating applications. Plumbers, electricians, radio repairmen, refrigeration men, metal and glass workers, and others will find that this torch is a useful convenience.

A single control valve varies the flame from an intense pencil-point to a roaring blowtorch in an instant. It burns equally well upside down, or at any angle. No special techniques are required to operate the Torchmaster—simply open the valve, light the burner, and adjust the flame to the job requirements. Extremely compact, (2 1/4 by 13") the torch is easy to handle, invaluable in cramped spaces, and can be carried or stored anywhere.

One filling of the Torchmaster will

last the average working day in continuous use but a charge will last indefinitely with intermittent burning.



It can be filled from standard containers at a cost of from three to five cents. Descriptive literature will be mailed upon request. Write:

Industrial Engineered Products Co.
7416 Melrose Ave., Dept. BB
Los Angeles 46, Calif.

WALTON TAP EXTRACTOR



THE FINEST TOOL FOR REMOVING BROKEN TAPS

● Removing broken taps need not call for the purchase of expensive equipment. Walton Tap Extractors have been used for years by toolmakers and mechanics all over the world. They are economical, fast. Purchase from your dealer, or write us for Folder No. 12 and details of free trial offer.

THE WALTON COMPANY
HARTFORD 10, CONNECTICUT

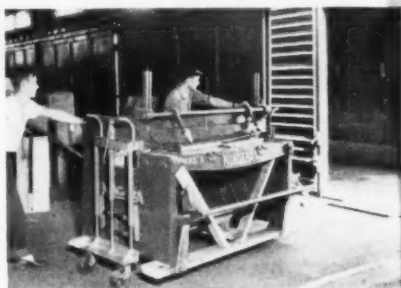
ROL-A-LIFT TRUCKS FOR MOVING HEAVY, BULKY LOADS

Two new Rol-A-Lift truck models are announced by the Skarnes Engineering and Supply Company. The manufacturer claims that the Rol-A-Lift truck will handle loads too heavy or bulky for fork trucks and will move loads into tight places where neither fork trucks nor cranes can operate.

One of these new units, the Model M-2, has a 2000 pound capacity and is especially suited for moving long counters, freezer units and similar bulky items. The M-2 is built with adjustable forks to accommodate crates of varying width, and operates with a mechanical cam lift. The other new model, the M-8, has an 8000 pound capacity. It is suitable for moving heavy production machinery such as presses and lathes as well as heavy crated products, palletted units, etc.

Rol-A-Lift units are used in pairs and are moved about like hand trucks. To load a crate, one Rol-A-Lift is placed at each end with the forks inserted underneath. Each unit is then

jacked up, lifting the crate and putting it on wheels, ready to roll. After the load is moved into place, it is lowered gently to the floor, at controlled speed.



All models have 360° swiveling casters for easy maneuverability. A folder describing all models will be sent on request, write:

Skarnes Engineering and Supply Co.
2428 Riverside Ave., Dept. BB
Minneapolis 6, Minn.



SAVE MONEY

USE ENCO TOOLHOLDERS

Write for catalogue
No. 48 giving lathes
swing and tool size
used.

Model 4 1/2-S Turret Tool Post Shown above for
14" to 18" lathes

- ★ 12 Position Indexing
- ★ 3 Working Positions for Each Tool
- ★ Hardened Steel Construction
- ★ Accurate Reindexing
- ★ Other Models Available for Lathes 6" to 42" Swing.

Model B Tailstock Turret shown above for 12" to 20" lathes

- ★ Mounts 6 Tools
- ★ Hardened Tapered Indexing Mechanism
- ★ Finger Tip Control
- ★ Turret Lines up Directly with Spindle Center
- ★ Furnished with No. 2, No. 3 and No. 4 MT Arbors

Also Mfrs. of Enco Hexturret Bed Turret for 9" to 16" Lathes.

ENCO MANUFACTURING COMPANY Dept. 249, 4522 W. Fullerton Ave., Chicago 39, Ill.

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speed.

WHITNEY-JENSEN PRODUCTS
38 YEARS EXPERIENCE

OUR NEW CATALOG 16-49

Shows many Labor and Time-
Saving Tools and Machines

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WHITNEY METAL TOOL COMPANY
115 FORBES ST. • ROCKFORD, ILL.

STERLING DRILL GRINDER



CAPACITY:
3/8" to 2 1/2" drills.
5" x 9" adjustable table.

MOTOR: 1/2 hp,
3450 rpm.
NET WT: 250 lbs.
CRATED: 320 lbs.

MCDONOUGH MANUFACTURING CO.
EAU CLAIRE, WISCONSIN, U. S. A.

Immediate Delivery FROM STOCK



GREAVES-SILENT BAKELITE GEARS

No waiting when you order Greaves Silent Bakelite Gears. • We have them in stock NOW! • Your order will go forward immediately. • You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. • You'll marvel at their great strength to carry big power loads... their remarkable ability to successfully operate completely submerged in water. • You'll welcome their low cost. • No metal reinforcements required. • Save Time... Money... Labor!

We also make silent gears of rawhide and Fabrolite.

Write for Circular.



Greaves MACHINE TOOL CO.
2013-18 Eastern Ave.
Cincinnati, Ohio

**WHY KEEP YOUR FINGERS CROSSED
for MACHINE ACCURACY? USE**

VIMCO^{Light}

Be sure you are getting the most from your machines and operators. Use VIMCOLIGHT with flexible arm adjustment. Many machine builders do! Easy to install. A low cost feature... fully guaranteed. Complete details in folder No. 74.

VimcoLight
at right on
LANDIS
Bench
Skiver



Distributorships Available
VIMCO MFG. CO.
109 Brayton St.
Buffalo 13, N. Y.

CLOSED
TRADE



Plain Type

CLOSED
MARK



Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET.



AUTO Moulding & MFG. CO.

**1110 E. 87TH ST.
CHICAGO 19, ILL.**

SPECIFICATIONS:
Open Width $\frac{1}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{1}{8}$
Lengths to 120"

SEMI-OFFSET



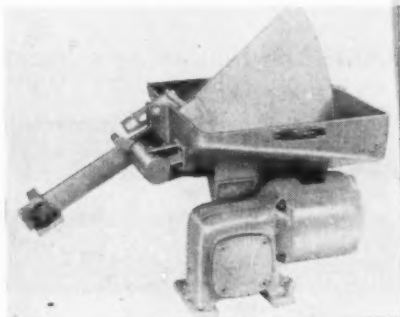
FEEDALL VERSATILE AUTOMATIC HOPPER FEED

A new Automatic Hopper Feed has just been introduced by Feedall Machine and Engineering Co., designers and builders of automatic feeding devices. The new unit, Model H-500, is described as a completely automatic, self-contained and self-driven hopper feeding unit. It is powered by a $\frac{3}{4}$ h.p. gearmotor which also serves as a mounting pedestal.

The Automatic Hopper Feed will accept various types and shapes of work, such as bolts, screws, machine and wood screws, pins and many other types of parts. It will feed cylindrical work from $\frac{1}{8}$ " to $\frac{3}{8}$ " diameter, and lengths of 4". It will also feed headed or shoulder work in the same diameters and lengths.


This versatile unit can be attached to centerless grinders, induction heaters, punch presses and other special machines and fixtures. A further suggested use is mounting the unit on old

style wood screw shaving machines, making them completely automatic. For complete details and specifications on



the Model H-500, write the manufacturers:


Feedall Machine and Engineering Co.
70 Vine St., Dept. BB
Willoughby, Ohio




**SOCKET HEAD
CAP SCREWS**

**MILLED
FROM BAR**

USE ECONOMY — DERIVE ECONOMY



**HOLLOW
SET SCREWS**



**MADE OF
ALLOY STEEL**

ECONOMY MACHINE PROD. CO., 5207 Lawrence Ave., Chicago 30, Ill.

Little Fiver

HYDRO-PRESS

\$84.00

FIVE TONS of smooth power is at your service with this compact and versatile tool.

The perfect press for garage, electric motor shop, refrigerator repair and machine shop.

Will operate lying horizontal.

Ram has removable anvil and retracts itself when released.

Stroke $1\frac{1}{2}$ "

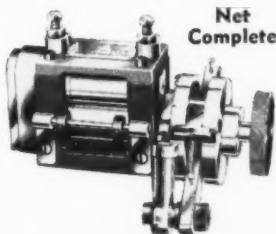
Weight 100 lbs.



ARTHUR J. HURT & CO.

360 SOUTH NAVAJO STREET
DENVER 9, COLORADO

A Most Versatile ROLL FEED for \$89.50



Net
Complete

A PRECISION ROLLFEED with Semi-Steel Castings, Hardened and Ground Rolls and Friction Discs. Other sizes priced proportionately low.

Write for Circular

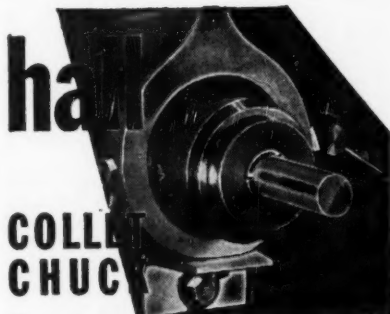
ROLL FEEDS CORP.

148 Middle St. Pawtucket, R. I.

**SEND
for Our
CATALOG**

of
**MACHINE TOOL ACCESSORIES
SPECIAL TOOLS
and INSPECTION DEVICES**

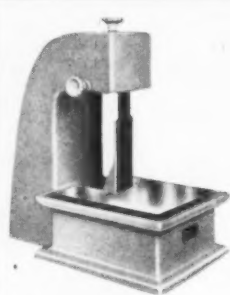
MONTGOMERY & CO., Inc.
53 PARK PLACE, NEW YORK 7, N. Y.



SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

2-inch capacity, \$145; 3-inch capacity, \$295;
1-inch capacity, \$95

Round, square or hex collets, plain-serrated
HALL MANUFACTURING COMPANY
622 Tularosa Drive • Los Angeles 26, Calif.



S A N D E R A L L

The new bench-type Wet and Dry Belt Sander, Grinder, Burring and Polishing Machine. The ideal machine for increasing production in all factories.

This machine can be used on all wood, metals, plastics and die-castings, etc.

Belt Size—2" x 36"
Work Table—9" x 10"
H. P. Required— $\frac{1}{4}$ to $\frac{1}{2}$

Price— \$69.50 F.O.B. Orange, Mass.

Write for descriptive literature.

H. & N. Machine Co.

204 Mechanic Street
Orange, Massachusetts

Micro
Supreme
**LAY-OUT AND
IDENTIFICATION DYE**

13 COLORS

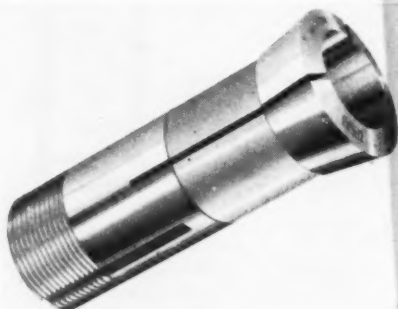
For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for trial sample and circular.

**MICHIGAN CHROME &
CHEMICAL COMPANY**

6340 E. Jefferson Ave. • Detroit 7, Mich.

NEW WADE COLLET FEATURE

The Wade Tool Co. announces a new development in their manufacture of collets. From now on, all Wade Collets will have their threads ground from the solid after hardening. The general practice in making collets is to grind only the body, the angle, and the hole, but Wade engineers have established a precedent in deciding that all surfaces of critical importance should be ground after hardening.



Grinding of the threads after hardening provides against any possible distortion in thread pitch or in thread shape. Also, there is no distortion as to concentricity, for the threads will of necessity be concentric with the rest of the collet.

Wade Collets have an exclusive feature in the buttress thread, the manufacturers state, which is used instead of the customary 60° standard V-thread. By presenting mating surfaces at right angles to the pulling force, any expanding tendency is eliminated, and the maximum strength and security are obtained. Screw threads cannot override.

Another interesting development is the Wade Collet Seal that is now available. This seal entirely closes the slots and gives protection from chips which might otherwise enter the slots and create a problem. For complete details, write:

Wade Tool Co., Dept. BB
Waltham, Mass.

LYON - Raymond

**SHEET FEEDING
and
DIE HANDLING
TABLES**



LYON-Raymond
Corporation 778 Madison St., Greene, N. Y.

NEW! INDEXING FIXTURE



Here is a new
G & H fixture
which can be used
horizontally or
vertically . . .
speeds precision
machining. 2, 3,
4, 6, 8, 12 and
24 indexes set on

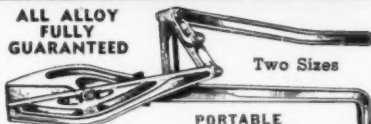
one index plate. Capacity 0 to 1/2". Write for
full details.

G & H MFG. CO.
327 ELM STREET, FITCHBURG, MASS.

BREMIL

The IMPROVED Compound Lever Shears

**ALL ALLOY
FULLY
GUARANTEED**



Two Sizes

PORTABLE

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to 1/4" steel plate.

BREMIL MFG. CO.
1720 Pittsburgh Ave., Erie, Pa.

CARROLL DIVIDING HEADS



Catalog
on
Request

3 SIZES - 4 MODELS - 6" to 12"
TROYKE MFG. CO.
4422 APPLETON ST. CINCINNATI 9, O.

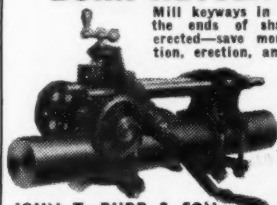
'New' NESTING TYPE TOTE PANS



20" Long x 12"
Wide x 6 1/4" Deep
16 Ga., drag holes,
handles both ends.

J. L. LUCAS & SON, INC.
BRIDGEPORT 5, CONN.

BURR KEYSEATERS



Mill keyways in the run or on
the ends of shafting already
erected—save money on altera-
tion, erection, and repair work.

Made in 4
sizes, for
hand or mb-
tor opera-
tion.

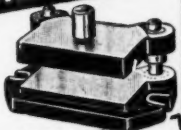
Write for
Bulletins and
prices.

JOHN T. BURR & SON
429 Kent Ave.,

Brooklyn, N. Y.

DANNEMAN Precision DIE-SETS

Precision-Bored
on Master Plates



DANNEMAN DIE-SET DIVISION
ACME-DANNEMAN COMPANY, Inc.
201 Lafayette St. New York 12, N. Y.

CATALOG
ON REQUEST

60 YEARS' Manufacturing

Multiple Spindle Drilling and Tapping
Machines — Automatic Drilling and
Tapping Units — Multiple Spindle
Attachable Drill Heads — Hot and
Cold Swaging Machines — Hammering
Machines — Tools, Jigs & Fixtures
Contract Work — Special Machinery.

LANGELIER MANUFACTURING CO.
PROVIDENCE 7, RHODE ISLAND

Banded THRUST BEARINGS



REGULAR
OR SPECIAL
DESIGN TO 24" O.D.

We also make Thrust Bearings
interchangeable with other manu-
facturers.

We take in extra work on
Blanchard Grinders.

ACORN BEARING CO.
66 Stanley Street New Britain, Conn.



WHO

MAKES QUALITY SCREW MACHINE PRODUCTS

It's no question . . .
it's a fact!

When you need cap screws, set
screws, milled studs or coupling
bolts of any machineable material
and with any thread, remember . . .
WHO makes them better.

WHO is... *Wm. H. Ottemiller* Co.

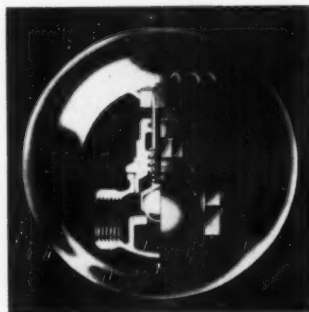
YORK, PENNA.

Write for name of nearest distrib-
utor and our free illustrated folder.

"BULL-DOG" BALL VALVE

The "Bull-Dog" Ball Valve, product of the Carpenter Manufacturing Corp., is shown for the first time in the illustration. The principles involved mark a definite departure from former practices. A precision ground stainless steel ball is used to replace the conventional discs, poppets, etc., effecting a life time seating member with harmless effect upon the seat.

The ball is spun into its retainer, allowing a slight clearance, which permits the ball to spin when the valve is opened or closed, thus permitting the ball to find a new seat each time. Care is exercised to hold the ball clearance accurately, thus preventing chatter when opening, closing, or throttling.



Years of field service tests have earned a high reputation for the Ball Valve. Among the reports received, one engineer reports that after 52,000 openings and closings under 300 lbs. pressure, the valve showed no wear, and that the ball and seat looked like new.

The Ball Valve is supplied with "O" Ring Seals for normal service where high temperature is not involved. Conventional steam packing is used in valves installed in steam or other high temperature service. Ball Valves are available in 1/2" and 3/4" pipe sizes, in brass. For complete details, write:

Carpenter Manufacturing Corp.,
9523 Detroit Ave., Dept. BB
Cleveland 2, Ohio

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoils of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular
NIELSEN TOOL & DIE COMPANY
1962 W. Eleven Mile Road,
Berkley, Mich.

Save Space and Lifting

Yohe Handy Rack floor stands take less space, hold more stock and require less lifting. Four arm rack - 51" high stacks, 10,000 lbs. Five arm rack 57" high holds 12,000 lbs. flat or round stock — at safe lifting heights. Use against wall or back-to-back in center of room.

Let us send details and prices
WM. S. YOHE SUPPLY CO.
503 Mahoning Rd., N.E. Canton, Ohio



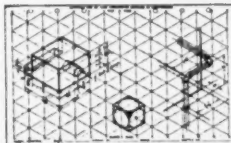
ABRASIVE CENT-R-LAP TOOL

Saves time, eliminates diamond dressing. Comes changed in seconds. Available in 2 sizes $\frac{1}{8}$ " and $\frac{1}{4}$ " Cent-R-Laps and abrasive Comes.

Write for descriptive literature and prices.

J. R. Reich Manufacturing Co.
43 E. Stroop Rd. Dayton 9, Ohio

ISOMETRIC SKETCHES ARE



**EASY TO MAKE
AND READ!**

One trial will make you another steady user of WADE'S ISOMETRIC blue lined paper. Shows all surfaces and interior to scale. Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular. 1422 E. 160th St. Dept. H. Cleveland, Ohio

Wade Instrument Co.

**The Very Best
Facilities For . . .**



IN SMALL LOTS
DAYTON ROGERS
Manufacturing Company

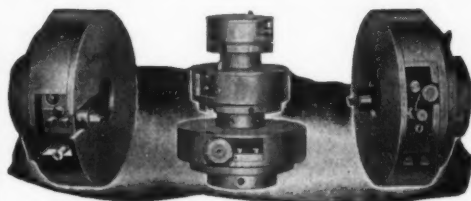
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precision-cut and inspected, on new, latest equipment. All sizes and types. Send samples or blueprints for quotation.

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FACING HEADS
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One-way Tool Feed — 6, 9 and 12" sizes.

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Save many costly set-ups.
Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

WEBB BENDING ROLL FORMS CORRUGATED PIPE

The Webb Corporation, manufacturers of plate bending rolls, has recently begun manufacturing a line of corrugated plate bending rolls. This new corrugated plate roll, which can be furnished in numerous sizes and capacities, is designed to form corrugated plate into culvert pipe.

The Webb Corporation, pioneer machinery manufacturers and steel fabricators in the Southwest, builds a complete line of horizontal and vertical type plate bending rolls from the lightest

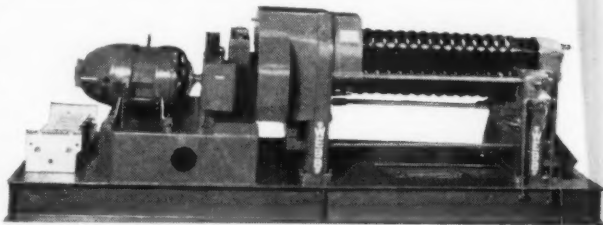


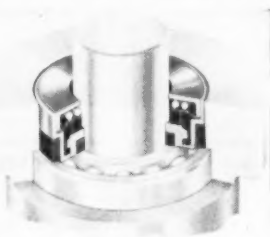
plate to 2" plate. For complete and detailed specifications on these powerful new units write the manufacturers:

**The Webb Corporation, Dept. BB
Webb City, Missouri**

NEW GITS PACKAGED SEAL UNIT

A new "packaged" seal unit designed for horizontal and vertical rotating shafts is announced by Gits Bros. Manufacturing Co. With both rotating and stationary surfaces built inside a metal cartridge, this seal permits a low-cost, fool-proof installation, according to its manufacturer.

The new Gits Unit Seal uses a radial seal joint, also known as face type or end type principle, which does not wear on the shaft, bearing race or any other parts in the machine or pump.



The seal is factory assembled, and once the flat seal surfaces are placed in position they remain in contact without warping.

The user need not prepare a hardened and lapped rotating seal surface of any kind. Seal faces are machine

lapped uniformly flat to a definite specification, and they must pass a rigid flatness test designed to assure a leakproof seal joint prior to leaving the factory.

The major components consist of the stationary seal ring, diaphragm, spring assembly, and the rotating seal ring which is variable in shape according to the design requirements of the particular application. The principle of obtaining axial movement in the seal through the use of a free flexing diaphragm has been retained.

The stationary seal nose is permanently fastened to the inner edge of the synthetic rubber diaphragm, with the outer edge permanently fastened to the outer seal case, achieving a positive leakproof flexible connection between the seal case and the seal nose. With the easy flexing diaphragm, there is no need for heavy spring pressures to obtain axial motion. The spring in the Unit Seal is required only to keep the rotating and stationary seal surfaces in leakproof contact.

A new descriptive bulletin may be obtained from the Seal Division:

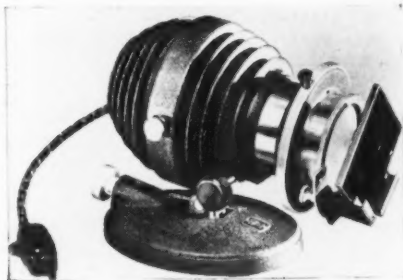
**Gits Bros. Mfg. Co., Dept. BB
1846 So. Kilbourn Ave.
Chicago 23, Ill**

MICROSCOPE ILLUMINATOR FOR LABORATORY WORK

A new Microscope Illuminator designed exclusively for routine and advanced laboratory work is announced by American Optical Company's Scientific Instrument Division.

Correct microscope illumination is essential for obtaining the best results from any microscope. The new Spencer No. 735 Lamp is an instrument with efficient optics and precise, conveniently located mechanical controls. The lamp furnishes both Kohler and parallel illumination for bright field and phase microscopy, photomicrography, microprojection, and dark field illumination.

All adjustments are external and located for user convenience. Ventilating fins on the die-cast aluminum body, coupled with natural draft ventilation, assure cool operation. Rack and pinion focusing adjustment is equipped with two buttons for focusing by either hand.

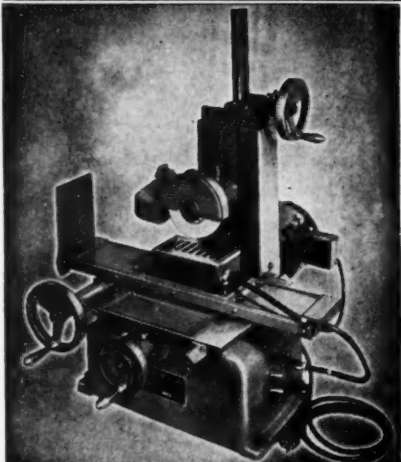


A screw type tilting adjustment, operating in a threaded nut, is placed low and to the rear of the base for handling coolness. The concave glass reflecting mirror is precisely adjustable. For easy access to external parts, lamp body may be separated by releasing two thumb screws.

The new Spencer No. 735 Microscope Illuminator may be obtained with or without an iris diaphragm which has both knurled ring and knob adjustments. For accessories and specifications, write:

**American Optical Co.
Scientific Instrument Div., Dept. BB
Buffalo 15, N. Y.**

SANFORD



High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed "For the job that fits in your palm."

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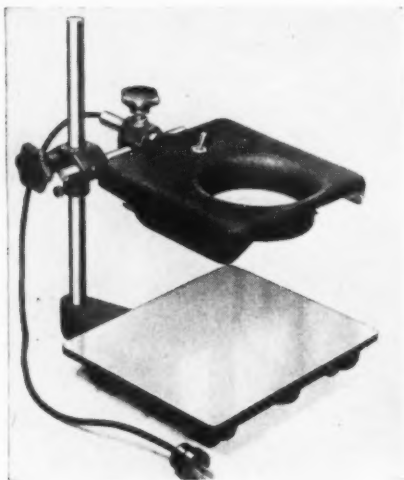
SANFORD MFG. CO.

1020-28 Commerce Ave.

Union, N. J.

LAY-OUT & INSPECTION PLATE WITH MAGNIFIER

A useful lay-out and inspection plate, equipped with an adjustable, illuminated magnifier, has recently been



introduced by All American Tool & Manufacturing Co. The precision ground plate is 11" x 9", and is cross ribbed underneath for rigidity. The illuminated magnifier is adjustable to any angle, and to any height up to 10".

The magnifier consists of a 4½" diameter specially ground glass. A 25-watt tubular lamp on each side of the magnifying glass directs the rays onto the work being inspected. A toggle switch is provided on top of the magnifier. The unit is equipped with six feet of rubber-covered cord and a standard plug for 110 volt current.

No wrenches are required for the adjustment of the magnifier holder. The vertical position of the magnifier on the post is maintained by a small hand wheel. The unit is designed for tool and die makers, laboratory technicians, and others engaged in precision work. Further information will be sent upon request.

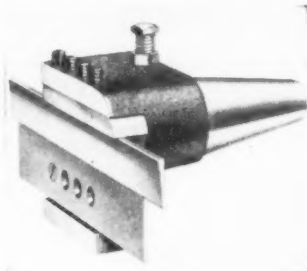
All American Tool & Mfg. Co.
1014 W. Fullerton Ave., Dept. BB
Chicago 14, Ill.

ENGINE LATHE CUTOFF TOOL

A new type of cutoff tool holder is announced by the BiggStava Company, manufacturers of the K-J Quick Change Tool Holders for Engine Lathes. The cutoff tool rests on a supporting blade which is slightly concave along the top edge while the lower edge of the cutoff blade is convexed to fit. This solid support eliminates the chatter, tool breakage and slow operation that frequently occurs in cutoff operation on engine lathes.

The cutoff blade can be fed into the work under power with no chatter or vibration. The holder accommodates any standard ground or un-ground cutoff blade. The adjusting screw enables the operator to adjust the blade to the correct height without disturbing the adjustment of other tools he may be using in the quick change tool holder base. The screw rests on a hardened button, assuring accurate repeating, making the cutoff operation certain and easy. Seven

inch bar stock may be cut off easily. This tool is one of a line of thirteen standard quick change tool bit holders made in five sizes for lathes with swings from 9" to 72". For additional informa-

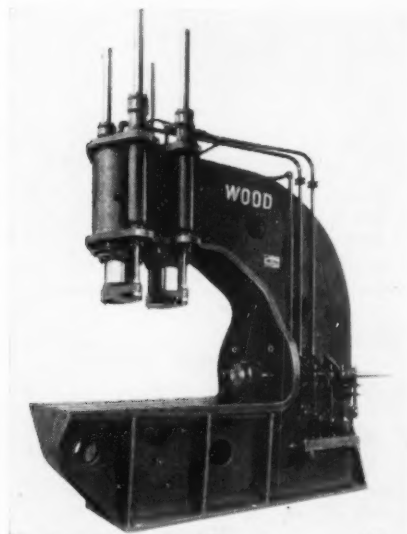


tion concerning this device, write the manufacturer:

The BiggStava Co., Dept. BB
3357 Union Pacific Ave.
Los Angeles 23, Calif.

R.D. WOOD SECTIONAL FLANGING PRESS

Designed for use in sectional flanging operations, this R. D. Wood Hydraulic Press is used also for joggling and upsetting work. This machine delivers a 200-ton capacity with the two vertical main rams operated in unison. Its capacity with a single vertical ram is 100 tons. The horizontal ram, with a 72-ton capacity, has a detachable cross-head of cast open-hearth steel, with bore and tapered key slot for attachment of tooling. A pulpit arrangement conveniently locates the operating valves.



Arranged for accumulator operation and equipped for connection to accumulator pipe line, the press may also be furnished self-contained, with complete pumping units and control equipment.

Designs for this hydraulic press are available from 150 to 300 tons, with larger sizes available for special requirements. Write for information to:

R. D. Wood Co., Dept. BB
Public Ledger Bldg.
Philadelphia 5, Pa.

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Curtiss-Wright Corporation ranks our product with their best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts.

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Pictured: a 38-Spindle Heavy-Duty Drill Head.

**DESIGNERS AND
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MULTIPLE DRILLING EQUIPMENT**

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MICHIGAN DRILL HEAD CO.
971 E. 8 MILE ROAD HAZEL PARK, MICH.

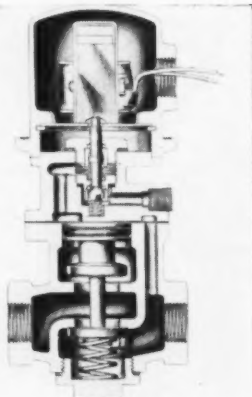
IN-LINE AIR VALVE FOR MACHINE TOOLS

Split-second control of air power on machine tools and similar applications is provided by a new series of "Full-Flo," in-line valves designed by Ross Operating Valve Company.

A variety of sizes is available in both three-way and straightway in-line models. The three-way is used for the control of single acting cylinders, and the straightway for instant "on-off" service of either a plant-wide system or a single coolant line.

The $\frac{1}{4}$ " to $\frac{3}{4}$ " sizes are pilot type, solenoid operated, with the solenoid releasing the air power which operates the valve. Models can be furnished with inlet ports either normally open or closed. All feature full pipe size crifices for maximum power capacity. An oversize exhaust port makes the three-way models particularly suited for exceptionally fast reversal.

For smaller requirements, $\frac{1}{8}$ " direct solenoid operated valves have been designed for instantaneous, efficient action. In addition, 1 inch and $1\frac{1}{4}$ inch



models will also be available. For complete details, write:

Ross Operating Valve Co., Dept. BB
120 E. Golden Gate Ave.
Detroit 3, Mich.



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Flexolap FOR SPEED
AND ACCURACY"
—Karl Harig
Harig Manufacturing Corp.

Available all sizes $\frac{3}{16}$ to $\frac{3}{4}$ inches ... also
midjet laps for sizes under $\frac{3}{16}$ inch.

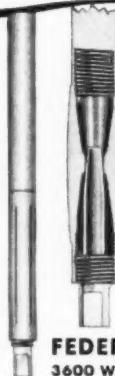
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FEDERAL TOOL CORPORATION
3600 W. Pratt, Chicago 43, Illinois

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Flex-O-Lap's strong, spring tension qualities adjust quickly and accurately to any size.

Off-center slots permit a strong lapping pressure without danger of seizing.

Sensitive flexible expansion up to 15% or more.

Easier to lap holes straight and round with Flex-O-Lap, adjustment screw assures utmost precision.

FEDERAL TOOL CORPORATION
3600 West Pratt • Chicago 43, Illinois

STAPLE VERTICAL HONING MACHINE

The model "B7" Vertical Honing Machine, illustrated, has recently been added to the line of honing machines manufactured by the Staple Engineering Co. This unit is hydraulically operated, and electrically controlled. It



is adaptable to work having inside diameters ranging from $\frac{1}{2}$ " to 4" inclusive, and up to 6" in length. The timing cycle is adjustable from 3 to 180 seconds, with standard equipment. Size control is regulated by a manual graduated dial.

The reciprocating work table is 6" wide x 18" long and has an 8" travel. A variable speed drive is provided to the honing spindle and is adjustable for ideal honing speeds. The honing stones are fed out and contracted automatically, and the pressure and rate of feed are adjustable, thus the proper pressure for best results is maintained during the honing cycle. The machine is supplied complete with all electrical controls, self-contained hydraulic unit, coolant pump and tank. For complete specifications, write the manufacturer:

Staple Engineering Co., Dept. BB
1315 So. Woodward Ave.
Birmingham, Mich.

*The most versatile
fixture for quick
accurate indexing
...SUPER-SPACER*

This fixture allows rigid control of accurate machining operations within its scope at speeds and feeds limited only by the capacity of the holding means and the power of the machine.

Standard mask plates have 2, 3, 4, 6, 8, or 12 divisions. Specials made to order. All Super-Spacers come complete with mask plates, Universal chuck and chuck wrench. Write for Bulletin S-101.

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JIG BORING

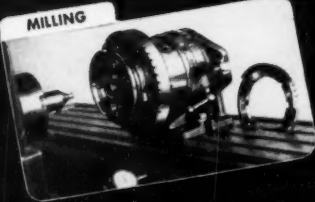
GRINDING



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MILLING



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Special

The HARTFORD SPECIAL MACHINERY Co., Hartford 5, Conn.

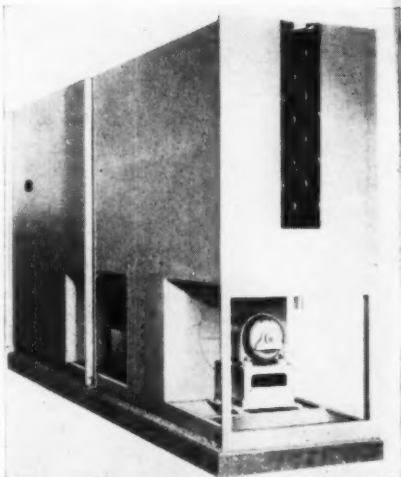
OPTIMUS METAL PARTS DRYER

A new mechanical dryer for the spotless drying of metal parts, is announced by Optimus Equipment Company, manufacturers of mechanical metal washing, degreasing, pickling, and drying equipment.

The Optimus "Spotless" Dryer was originally designed to meet the needs of the plating industry for the drying of polished metal surfaces without water spots, stains or streaking. They have since been adopted for all types of drying of metal parts handled either on racks or on monorail systems on a continuous production basis.

High velocity jet nozzles reduce the drying time to a minimum. These nozzles are directional and adjustable. Combinations of cold and hot air drying are employed.

These units require a minimum of floor space. Fans, heating units and motors are all located within the framework. Where overhead space permits, dryers may be suspended from the ceiling. All auxiliaries are easily accessible for inspection and maintenance. Air



for drying can be heated by steam, gas or electricity. For complete details, write:

**Optimus Equipment Co., Dept. BB
197 Water St.
Matawan, N. J.**

PORTABLE STOCK ROOM OR SUPPLY TABLE

The Tote'em Table being introduced by Alhambra Products Company is a three-tiered, movable table made of



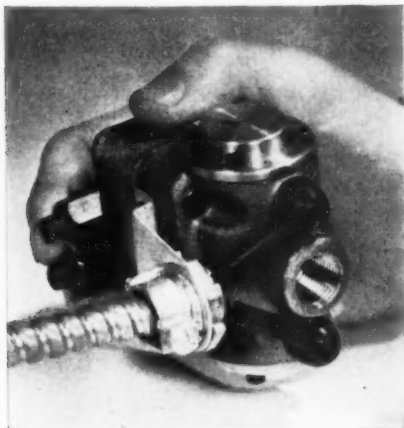
16 and 18-gauge sheet steel. It is useful for moving tools and supplies, or for stock room use. Shelves measure 16" by 22" with a one-inch protective flange. There are 12½" of space between each shelf, allowing room for stacking. Total height of the table is 33". The top shelf can be reversed to form a smooth table-top without the flange.

The Tote'em Table has a convenient handle for pushing and four swivel-type, 3" rubber-tired casters made for heavy duty. The entire table is finished with a deep green hard finish baked enamel that will hold up under strenuous usage. For complete details, write:

**Alhambra Products Co., Dept. BB
822 Date St.
Alhambra, Calif.**

NEW ELECTRICALLY-CONTROLLED, AIR-POWERED VALVE

A new solenoid-actuated air control valve which uses the air it controls to operate the valve, has recently been announced by The Bellows Co., makers of pneumatic devices and equipment.



The new valve consists of a cast bronze body incorporating a single air inlet, suitable electrical terminals, and a cylinder in which floats a light weight piston. This piston engages and shifts a four-way shear-flow air valve. The caps enclosing each end of the cylinder hold small 8-volt solenoids, whose plungers, operating through only $1/32$ " of movement, release the full pressure of the air supply line to drive the light weight piston and thus shift the four-way shear-flow valve in the desired direction. The valve will operate on five to 150 pounds air line pressure.

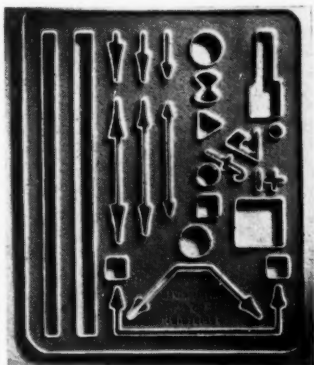
The new valve is so fast in its movements that tests counters have recorded its speed up to 2200 movements per minute. Despite the high rate of speed, maintained hour after hour, the heat generated is scarcely noticeable to the touch. Operating at low voltage, and with an armature movement of only $1/32$ ", the solenoids develop very little heat, and since the solenoids are mounted within the expanding air

stream, any heat is immediately dissipated. Low voltage, built-in, air-cooled solenoids consume only 6 watts of electric energy. The new valve is available in $1/4$ " and $3/8$ " port sizes and comes complete with a special transformer to reduce normal line voltage to the required eight volts. For complete information, write William C. Richards, Jr., at:

The Bellows Co., Dept. BB
222 W. Market St.
Akron, Ohio.

USEFUL TEMPLATE SPEEDS UP DRAFTING ROOM OPERATIONS

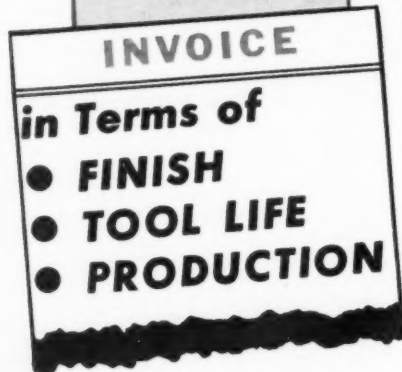
Rapidesign, Inc., announces its new No. 60 Dimensioner template for use in all phases of drafting. This device speeds up the call-out, dimensioning and lettering of drawings. It makes standard drafting symbols easily, neatly and accurately, according to its manufacturer. It is especially useful where drafting procedure requires uniformity. All symbols and sizes conform to standard drafting room practice.



The No. 60 Dimensioner is made of .040 high quality cellulose nitrate. Beveled cutouts of symbols are precision milled to give utmost in accuracy. The actual size is 4 " x $3\frac{1}{4}$ ". For information, write:

Rapidesign, Inc., Dept BB
P. O. Box 592
Glendale, Calif.

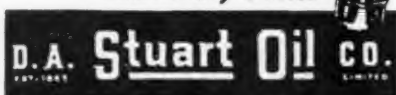
FIGURE THE COST OF YOUR *Stuart's* CUTTING FLUID



It is *wise economy* to buy cutting fluids on a performance basis rather than on price. This is borne out by a screw products company in Chicago machining round stainless steel, types 303 and 440. Operations include forming, drilling and reaming on an automatic screw machine. A number of different cutting oils had been used on this job, but after the first trial with Stuart's ThredKut, there was a marked improvement in finish, tool life was increased 3 to 4 hours and production was upped!

This is typical of how the best cutting fluid for the job will pay its original cost over and over. D. A. Stuart representatives can help you cut costs with cutting fluids best suited to your needs. Ask for booklet, *Cutting Fluids for Better Machining*.

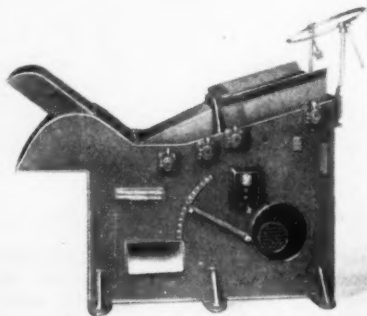
STUART *service goes
with every barrel*



2739 1/2 S. TROY ST., CHICAGO 23, ILL.

McKENZIE CHIP SEPARATOR FOR HIGH SPEED SEPARATION

The McKenzie Chip Separator separates the finished parts from the chips of steel, brass or aluminum after the oil has been extracted. It will separate parts from 3/16" to 2" in diameter and from 1/4" to 5" in length. Manually, this would be a dangerous and disagreeable job, because the workman would get their hands full of cuts and slivers. It would take one man several hours to pick out from the chips 5000 of the small pieces mentioned above. The Chip Separator accomplishes this in one minute.



The illustration shows the new Model M; it is ruggedly built, with large frame feet to eliminate vibration. It has two ball-bearing motors placed inside the frame—a 3 h.p. motor coupled directly to the blower, and a 3/4 h.p. motor with chain drive for self-feeder and vibrator. There are no belts or screens used. The unit has a wide delivery parts chute, and has a chip chute extending through the hood. Another feature is a tilting ring for the oil extractor pan.

In operation, the workman merely empties the oil extractor pan into the self-feeder of the chip separator and regulates the air blast to suit the size of the parts to be separated. The machine feeds material into the vibrator, spreads the material, shakes the parts loose, blows the chips into a truck, bin

or conveyor, and allows the finished parts to fall into a pan beside the machine. The capacity of the unit is one bushel per minute.

The dimensions are 6'2" x 4' x 3'. Weight is 1600 lbs. For complete operational details, write:

McKenzie Engineering Co., Dept. BB
Newton, Conn.

WESTINGHOUSE ALL-ALUMINUM PRECIPITRON

Development of an all-aluminum model of the industrial Precipitron that can handle a 10% greater volume of air than previous units of the same size, is announced by H. E. Seim, general manager of the Sturtevant Division of Westinghouse, Boston, Mass.

There are 99 plates in the new model, compared to 111 in the old, but three inches additional length in each plate gives the new unit 17% more dirt-trapping area. This extension in the direction of air flow gives the new Precipitron its ability to clean 10% more

air than previous models occupying the same space.

The new Precipitron will be built in two sizes; one 36" wide, the other 24" wide. The larger unit can clean 1000 cu. ft. of air a minute; the smaller one, 667 cu. ft. Installed in conjunction with ventilation systems, the cells are stacked in tiers according to buildings' air cleaning needs.

The 36" aluminum cell weighs 50 pounds, or 65 pounds less than the old cell for the same capacity. This lighter weight, combined with improvements in the frame and body construction, makes the unit easier and cheaper to install. Simplifying and revamping the layout of the plates and dust-charging section will make possible substantial savings in the cost of flushing the collected dust from the plates. Additional data on the new Precipitron will be furnished upon request to:

Westinghouse Electric Corp.
Sturtevant Div., Dept. BB
Boston, Mass.

**FOR MAXIMUM ACCURACY
 IN DRILLING HOLES**

**"...it's the bushing that makes
 the **W**HOLE difference"**

To maintain maximum accuracy in drilling operations, use the bushing that's precision made for the job . . . use **Acme! Write for catalog.**

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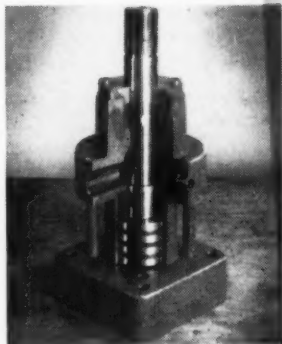
PATHON HYDRAULIC CYLINDERS FOR OPERATION UP TO 1500 P.S.I.

Available in three pressure series, twelve bore diameters, and seven styles of mounting, Pathon Hydraulic Cylinders have a wide application. They incorporate principles of design which are modern, scientifically sound and proven by extensive use. They are rugged, yet are as compact as is consistent with their durability.

Series EH Cylinders are for operation at 1500 p.s.i., and are available in the entire seven mounting styles in each of twelve bore diameters from 1½" to 9"; Series CH Cylinders are for operation at 1000 p.s.i., available in the same mounting styles and bore diameters; Series MH Cylinders are for operation at 750 p.s.i., and are made in six mounting styles, and six bore diameters from 4½" to 9".

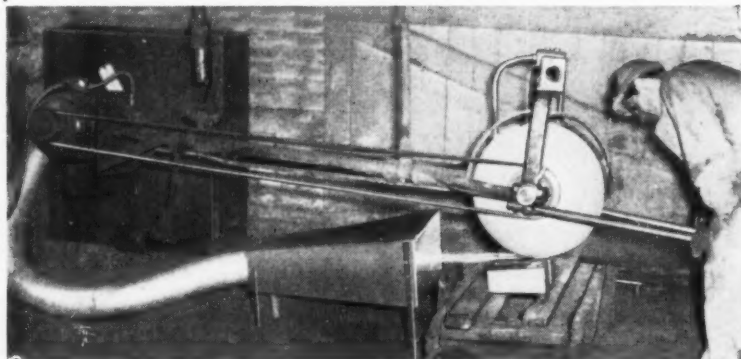
Principal construction features include cylinder heads of steel for Series EH, semi-steel for Series CH, gray iron for MH. The cylinder barrel is honed stainless steel tubing of the proper wall thickness for recommended service. The piston assembly is of mild steel or cast iron, depending upon the size and model. The piston ram is of heat treated alloy steel or mild steel; it is normally provided with external at-

taching threads. All series cylinders with standard rams to a diameter of 2½" incorporate a bronze bearing in the ram end cylinder head to take the side thrusts and gravity loads of the ram. All series and sizes of cylinders may be had either with adjustable or



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**Model 1150 (below) is only one
of a complete line (250 to 3600 cfm)**



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**AGET-DETROIT CO.
205 Main at Washington
ANN ARBOR, MICHIGAN**

**Phone 2-5585 For
Rush Shipment
From Stock**

non-adjustable cushions at either or both ends of the stroke.

For complete information on these important units, write the manufacturer for four-page illustrated bulletin.

Pathon Manufacturing Co., Dept. BB
6801 Vine St.
Cincinnati 16, Ohio

USEFUL DIAL CONTROL FOR SURFACE GRINDERS

An ingenious new Dial Control for precision setting of surface grinders, eliminating estimates of the depth of cut, has recently been developed by C. W. Whiting, Providence, R. I. The device consists basically of a replacement control wheel and wheel guard, coupled to a sensitive dial indicator. It is designed to replace the standard control wheel used on most surface grinders which provide only wide graduations for cut measurements. With the new Whiting Dial Control, the operator can provide accurately for the depth of cut of the grinding operation. He can even split tenths by actual settings instead of by estimate.



The control is installed simply by removing the present wheel of the grinder, drilling and tapping three holes, screwing on the guard, and replacing the Whiting wheel on the shaft of the machine. The wheel has a deep run groove to fit the hand in a firm grip for accurate adjustments, and a swivel handle to prevent wrist strain.

For complete information, write:

C. W. Whiting, Dept. BB
209 Roosevelt St.
Providence 9, R. I.

New Britain UNIVERSAL VISE

THE ORIGINAL

Swivels 360 degrees horizontally,
100 degrees vertically, to
give any angle or com-
pound of
angles.



Write for
Further
Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

LITTELL

**AIR-BLAST
VALVES**

**SAFER
FASTER
PRODUCTION**

LITTELL Air-Blast Valve automatically ejects pieces from punch presses. Keeps operator's hand out of danger zone. Increases safety and speed. Air nozzle quickly adjustable.

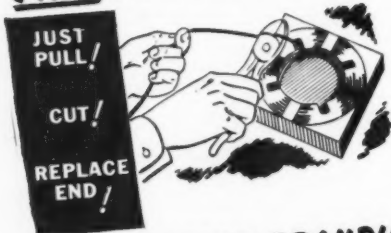
Other Littell safety devices include Pres-Vac Safety Feeders for picking up and feeding flat-surfaced materials; also, air-operated Mechanical Pickers for feeding pieces that vacuum lift will not pick up.

Littell makes a complete line of Automatic Reels, Feeds, Straighteners, Scrap Cutters, etc.

**REQUEST
BULLETINS**

F.J. LITTELL MACHINE CO.
4153 RAVENSWOOD AVE. CHICAGO, ILL.

It's Easy to Use This **MUSIC WIRE**



See **PRECISION BRAND'S** New **Dispenser Carton**

Save time, speed work with this top quality Music Wire packed in the ingenious dispenser carton—exclusive with Precision Brand. Wire is pulled from center; tension holds coil in place. Wire is cold drawn with micrometer precision to meet exacting requirements. Immediate delivery on a complete range of thickness .004 to .180 diameter.

SHIM STOCK



Brass or
Steel



Whether you choose the dispenser carton, the four-in-one assortment or flat stock packets, you can depend upon Precision Brand quality, accuracy, protective packaging and plain labeling to help do the job right.

CONSULT YOUR JOBBER

GROUND FLAT
STOCK

BRASS SHIM
MUSIC WIRE



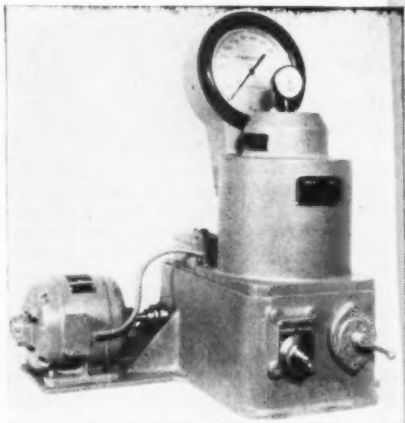
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MANUFACTURING DIVISION
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SHEET METAL DUCTILITY TESTING MACHINE

Steel Testing Machines, Inc. announce a new bench model Ductility Testing Machine for testing the drawing qualities of sheet metal. This machine is compact (35" in height and 26" across) and is provided with a fast cycle.



The piston travel speed is adjustable within a wide range by means of a simple die setting. Complete tests in as little as 15 seconds are possible. The machine is built with a capacity of 15,000 pounds to cup test material up to $\frac{1}{8}$ " in thickness or 30,000 pounds for material up to $\frac{1}{4}$ " in thickness.

The new unit is motorized and hydraulically operated. It incorporates two concentric pistons. The outer piston grips the test piece against the head at top of the machine while the inner piston makes the cup in the specimen. An 8½" diameter pressure gauge, protected against overload, incorporates a maximum indicating hand to show the pressure at which yield in the specimen occurs. A depth indicator shows the depth of draw at any moment by direct reading. For further data, write:

Steel City Testing Machines, Inc.
8843 Livernois Ave., Dept. BB
Detroit 4, Mich.

announce
Testing
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(across)

A new Carbide Tool Grinder, Model WD-10, has recently been introduced by Hammond Machinery Builders, Inc. Its features include the advantage that it can be used either wet or dry. For wet operation the operator turns baffle plate and exhaust outlet to off position and switches on the coolant sysem. For dry operation, operator turns off coolant and opens the baffle plate and exhaust outlet.

The 10"x19" tables are equipped with a removable steel wear plate and table slot, in which the compound protractor tool gauge slides, has openings to allow for coolant drainage. Tables can be quickly adjusted to any angle from 15° above to 30° below the horizontal.



A safety cup disc completely fills the open cup of the wheel and prevents injuries or dropping of tools into cup of wheels, which is a desirable safety feature. Patented "No Spray — No Splash" guards permit unrestricted vision but keep the operator and floor dry. The Model WD-10 is shown with two cup wheels. A Model WD-10S is also available with one cup and one straight wheel. Models are also available for dry grinding only. For more complete information write for Catalog No. 220 to:

Hammond Machinery Builders, Inc.
Kalamazoo 54F, Mich.

A general purpose, tangent cut, roller rest box tool of wide range for turning diameters from bar stock castings, forgings or other material. Applicable to all sorts of screw, turret and other machines, hand or automatic. It is simple to set and eliminates resetting when it is necessary to grind the bit. Write for descriptive folder giving complete information.

The Watson Mfg. Co.
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When 95% or all emery wheels in Michigan . . . proving ground of U. S. industry . . . are dressed on Last Word equipment. And when Last Word Dressers outsell others 10 to 1 in the same area there must be a reason. We know you too, will agree that Last Word Dressers ARE the last word. Write today for informative folder.

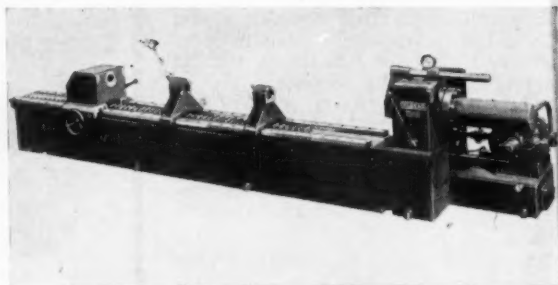
Dealers: Several attractive territories still open. Wire or write for details.

LAST WORD
SALES and ENGINEERING CO.
ROYAL OAK, MICH. P. O. BOX 287

OILGEAR 35-TON SPECIAL HORIZONTAL ASSEMBLING PRESS

Having an adjustable tail-stock capable of resisting full tonnage, makes this horizontal press made by The Oilgear Company adaptable for assembling a variety of propeller stub shafts in tubes. The daylight opening is adjustable from 30" to 180" in increments of 3". The tail-stock is moved on hardened and ground ways through a handwheel, pinion and stationary rack. The tail-stock is locked to the ways with screws and gibs; the locking pawl is lever operated. Two 4" bore x 6" wide split steady-rests with locking levers can be adjusted to any spacing and clamped to the ways. The ram has an auxiliary guide arm and rod. Hand lever control is spring centered.

An Oilgear Type DH-1017 two-way variable delivery pump is direct con-



nected to a 15 h.p. electric motor. Similar presses are used to assemble r.h. and l.h. rear axle tube assemblies to rear differential housings.

The general specifications of this assembling press include a stroke of 17"; a maximum daylight opening of 180". From the floor to the centerline of the ram is 37". Throat is 11 $\frac{3}{4}$ ". Pressing speed is variable up to 114" per min.; the return speed is variable up to 242"

SAVE TIME and MONEY with

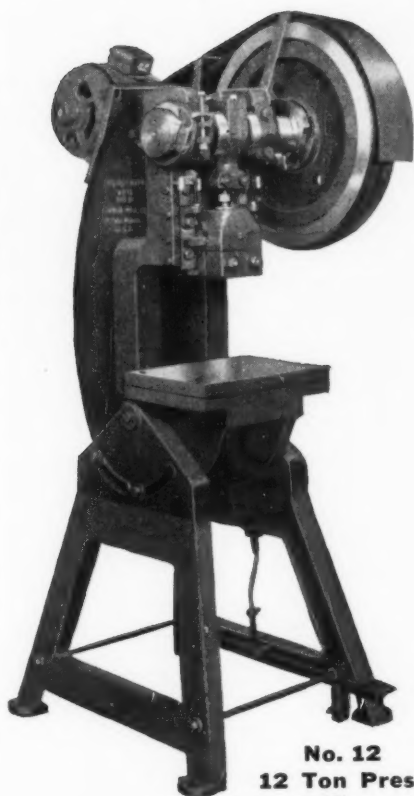


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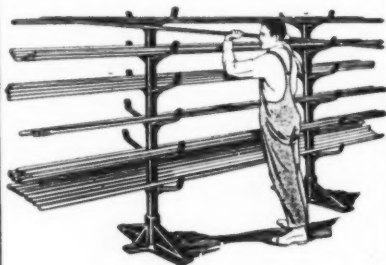
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Each BROWN SECTIONAL RACK combines five major and several minor features of design, all of which save money for its owner. The time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack is saved by the Brown Rack which requires but a few inches of side movement.



Each length, width and thickness of stock is displayed in Gold-Fish visibility for instant selection and workmen waiting for stock are served without waste of time. The BROWN SECTIONAL RACK is a simple, durable article built in five styles from standard interlocking metal sections. It cannot burn, sag or twist; unattached to the building, it can be moved at will. Changes in length of stock can be met by moving the units nearer or farther apart, while increases of stock can be met by simply adding more standard units. Built from metal throughout, depreciation is practically nil. SEND FOR BULLETIN NO. 26-B.

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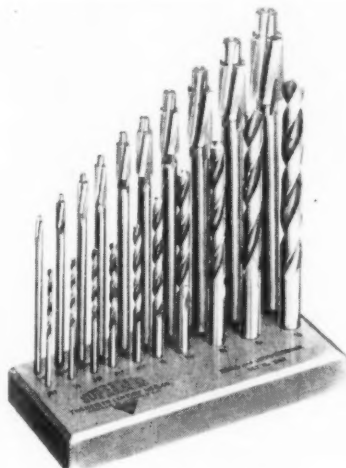
per min. For complete information, write:

The Oilgear Company
1344 W. Bruce St.
Milwaukee 4, Wis.

SUPERBORE COUNTERBORES AND DRILLS

The Twentieth Century Manufacturing Co. has introduced its Superbore series of Counterbores and Drills in standard sizes and oversizes above standard dimensions.

According to the manufacturers, Superbore Counterbores provide that shade of difference when counterboring operations require oversizes from standard dimension holes. Precision grinding inside of flutes and pilots, after heat treating, allows chips to flow out freely. The flutes are backed off to width of land to prevent heat generation, clogging or freezing. Each set is



serial numbered. No. 500 consists of ten standard dimensions, counterbores and drills. No. 400 is 1/64" oversize, and No. 300 is 1/32" oversize above standard dimensions. For complete information on the Superbore Counterbores and Drills, write:

Twentieth Century Mfg. Co., Dept. BB
3722 Montrose Ave.
Chicago 18, Ill.

NEW PRECISION PILLOW BLOCK

A new pillow block combining a rugged cast iron housing and an oil-impregnated porous bronze bushing has been developed by Precision Products Division of Atlanta Tool Company.

The new block is applicable in the manufacture of industrial equipment, as well as replacement in industrial operating equipment. It is available in sizes from $\frac{1}{4}$ " to $1\frac{1}{2}$ " in $\frac{1}{16}$ " intervals. The precision block is accurately machined from grey iron castings, the shaft bore, thrust faces and mounting holes so aligned that a square and parallel installation can be made from specifications.



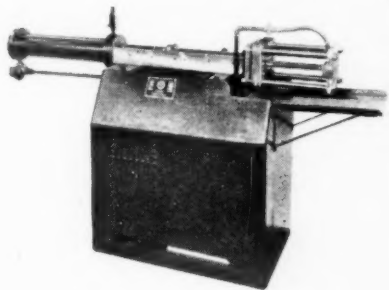
An important feature is the porous bronze bushing contained in the housing. The homogeneous capillary structure of this bushing enables it to store a surprising amount of oil which is fed as needed, without drip, to the entire bearing surface. An oil groove machined in the cast iron housing around the bushing provides an additional oil reservoir. The bronze bushing reduces heat to a minimum. Because of the block's compactness, what little heat may be generated is dissipated rapidly. Applying the coefficients of expansion of bronze and cast iron, the manufacturer has designed the block so as to eliminate any possibility of separation between housing and bearing.

For further details, write:
Precision Products Co., Dept. BB
Div. Atlanta Tool Co.
290 Simpson St., N.W.
Atlanta, Georgia

ZAGAR DEVELOPS DUAL ACTION BROACHING ATTACHMENT

Zagar Tool Inc., manufacturer of tools and special machinery, has recently developed an unusual broaching attachment for their standard 20" Pull Broaching Machine for push broaching two holes at one time, maintaining both relationships and hole center spacing. The two broaches are fastened permanently into the ram of the fixture, which is in turn pushed by the ram rod of the broaching machine. The work piece is located onto the head of the broaching fixture, and the operation consists of pushing the broaches through and pulling them back out. The return stroke serves to release the part, which in turn drops into the tray.

This operation would, of course, normally be performed on a vertical broaching machine. The customer for whom the attachment was devised had a limited amount of production on this part, and so specified a horizontal machine with a removable fixture, there-



by using a more versatile machine that could be applied to a large variety of work. For complete information concerning this unusual device, write the manufacturer:

Zagar Tool, Inc., Dept. BB
23880 Lakeland Boulevard
Cleveland 23, Ohio

Improved

SELLING TECHNIQUE

FOR MORE SALES

Lecture No. 14 SALES STRATEGY

by

Swan E. Bergstrom

Vice President, Cincinnati Milling and Grinding
Machines, Inc.

WHY SALES ARE LOST



Why are sales lost? One salesman didn't use his selling tools, another talked himself into an order and at once talked himself out of it again, a third lost a sale because his price was too high and did not stress the advantages of his machine sufficiently well to overcome the price disadvantage. With the help of well planned sales strategy these sales would not have been lost. Fourteen lost orders are analyzed.

The MACHINE and TOOL BLUE BOOK is happy to present to its readers the complete lectures delivered at the Sales Refresher Course at Cornell University, July, 1948. The course was sponsored jointly by the National Machine Tool Builders' Association and the American Machine Tool Distributors' Association. While lectures deal primarily with the selling of machine tools the fundamental sales principles can be adopted profitably by the manufacturers of general industrial products. The editors thank the NMTBA, the AMTDA and Cornell University for their cooperation in making this material available to their readers.

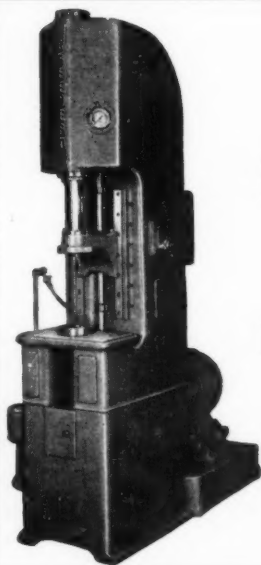
WHEN dealing with selling, I always like to think of selling in a military sense, because the comparison in the planning of sales parallels so closely the planning of military tactics with the one exception, that military planning is a planning of destruction, whereas sales planning is the planning of construction and for the betterment of mankind.

I do not propose to disclose too much of the sales strategy used by my company any more than any nation would want to disclose or discuss the military strategy it proposes to use. But sales strategy in general can be discussed and a lot can be learned by what has gone before. It is a known fact that our military academies today, our future military strategists for this country study the campaigns of Hannibal, Julius Caesar, Napoleon, and the campaigns of our American Generals during the Civil War. It is a known fact that in the early '30's members of the German General Staff were sent to this country to go over the complete area of the campaign that was fought by General Grant against the Confederate Armies, the Battles of the Wilderness,

because the strategy used by General Grant in that military campaign had in it some basic lessons that the German General Staff felt would be used in their campaign in the last World War.

So by the same token I think we should, talk this afternoon about sales strategy of known successful campaigns of the past, of sales campaigns that have been launched by some of our best sales strategists, and then we should take from them the lessons that these various campaigns can teach us, not only in their successes but in their failures.

First, I should like to review some of the few basic points that I feel are definitely a requirement for any good machine tool salesman. A good machine tool salesman must be possessed with certain basic qualifications if he is going to be a good salesman, if he is going to be a good campaigner, and if he is going to be a good sales strategist. One of the best organizers of sales strategy, a man who has probably contributed more to the art of selling in the automotive industry, has the following three very basic things to say about selling:



The New *Guided Ram* High Speed Hydraulic Press

For Fast Assembly and Broaching

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 SHAFT MACHINE**

- GRINDS
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One flexible shaft machine does all the operations listed above. Tool goes to the job, anywhere in the shop. Speeds production — saves lifting of heavy parts — lets operator reach hard-to-get-at places easily.

½ HP to 1 HP variable or constant speeds. Choice of mounts: pedestal, high or low; bench; or suspended. Uses Stow Flexible Shafts — a guarantee of maximum service since 1875. Write for full information.

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MANUFACTURING CO.

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1. **"Be Sincere.** Tell your friends, customers, and prospects the truth. Give them facts. Don't make promises you cannot keep. The sincere salesman never has any trouble about his words or actions. He makes the most sales because people believe in him and they know they can depend upon what he says.

2. **"Be Courteous.** The greatest sales device and the greatest sales lubrication for high volume in my experience have been politeness and courtesy. You know what our slogan was in our organization — 'He that is greatest amongst you, let him be the servant to all.' Not the boss, but

the servant. The servant can't say too much. The servant can't boss me; he works for me. 'He that is greatest amongst you let him be the servant of all.' That is the highest type of sales efficiency in a buyer's market.

3. "Then the third principle is more and better service; doing what you say you will do, and doing it at the time you said you would.

"Every organization has its analysts — its market experts — and statisticians. They develop charts — graphs — and trade area maps — to tell you everything you want to know about markets — their size — buying power — buying habits — race, color and creed. It's a far cry from a market study — on a cold piece of paper — to the flesh-and-blood human beings that make up that market. Strictly speaking, you don't sell markets! You 'sell' people! Whatever your product or service

may be — as a salesman your job is to seek out those people — one at a time — create an urge on their part to buy — and convince them that your product or service is more important to them than the money they have in their pockets. Just remember, you must think in terms of people, flesh-and-blood human beings who have the same emotions, the same buying urge, and the same sales resistance that you possess. These people must be sought out and sold one at a time."

These fundamental requirements in a salesman were set down by William E.

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A Kemp Smith Circular Table is a precision tool. Handles a large variety of jobs . . . milling circles, segments of circles, large cams and irregular contours. Ideal for gear cutting and high-speed continuous milling. Power feed and indexing attachment optional. Ask for Bulletin No. 106.

Kemp Smith Standard Attachments broaden the scope of your milling machine . . . lower capital investment . . . save in set-up time.

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in all popular sizes or types. Adaptable to ANY make of milling machine with standardized spindle.

of others. He analyzes his dissatisfactions and where the dissatisfactions and criticisms apply to his own efforts he takes steps to correct them. Where his dissatisfactions and criticisms are of things done by his own organization or his own association, he takes constructive steps to help correct those.

2. A self-starter is a man who gets things done today, the things that he knows have to be done and he faces these facts and goes about the job of completing his duties. He is not a procrastinator but a doer.

3. He does not offer excuses for the errors that he may have committed. He says to himself: "If I were boss here, would I be satisfied with these excuses?" And being a self-starter, he does not use excuses.

4. And I think the most important part of the make-up of any salesman is to look for the chance to step in and do things not expected of him.

He not only does his job but tries to find ways and means to do his job better without the prompting of his superior. The man who tries to do the things for his customer that the customer does not expect of him is displaying one of the most valuable traits of a self-starter. So, before we can even begin to use sales strategy as part of the job of the general staff of our sales organization, we must recruit into the rank and file of our selling organization people who measure up to the requirements that I have listed above and who are able, after the strate-

Holler who is a national sales consultant. Before you can plan sales strategy, the salesmen who are the soldiers of the sales force must be indoctrinated in these basic facts.

Secondly, this same sales army must be made up of individuals who are self-starters. A salesman who is not a self-starter can never use sales strategy. A salesman who is not a self-starter will never be a successful machine tool salesman. What is a self-starter?

1. A self-starter is a man who is dissatisfied and critical of his own accomplishments as well as the accomplishments

High Production Milling *Saves Labor... Cuts Costs*

For high production with precision—put the work on Kent-Owens Milling Machines! They're designed for rapid, easy set-up and operation. Rugged . . . with twin-post head mounting that assures balanced load—no chattering. Practical features throughout to help you produce more . . . save labor . . . and reduce costs! Write for bulletin. Kent-Owens Machine Co., Toledo, Ohio.



No. 2-20 Milling Machine
Table, 42" x 12"
Table travel, 20"

KENT-OWENS *Milling Machines*

gy is set, to carry the sales campaign out to success.

From now on in I am going to be like the extemporaneous preacher. I am going to talk extemporaneously about sales strategy and I'm going to talk from my heart, because selling is a distinct and definite personal reaction. Regardless of what we may set up as our sales objective and our sales strategy, we must never lose sight of the fact that we are dealing with people whose minds and thinking are pretty much the same as ours, whose reactions and whose prejudices are based pretty much on our same

psychological makeup. And because of this, I think it would be well to analyze why sales are lost, the same as our strategists planning our military campaigns determine why past campaigns were unsuccessful.

Mr. Richard C. Borden of the Borden Company of New York set down a list of reasons why sales are lost that I feel give very comprehensive analysis of sales strategy that did not work, and I am going to try this afternoon to set down some of the corrective measures by which the salesman in planning his sales program and sales strategy can overcome these losing reasons and apply winning reasons in their place:

1. "I lost the sale because I didn't use my selling tools. I had them all right — plenty of them — photographs, portfolios, demonstration samples — but I did not use them. Instead of firing my big guns,

I went after a bear with a bean shooter." Sales are lost in the machine tool industry by seasoned machine tool salesmen because they do not go in to their customer with a planned, organized presentation of the product that they have to sell. They assume that the customer knows of the product and probably knows as much as the salesman himself and he does not bring out into the open some of the important features that his machine has that will be able to produce money for the customer.

2. "I lost the sale because I talked too much. I talked myself into the order —



GUN TYPE SAW



At last, a saw which cuts anything, stainless steel, rubber, wood, aluminum, etc. Blade has a variable speed which is set in 45 seconds. . . . the stroke length of the blade is adjustable from 0 to 2", depending on thickness of mate-

rial. Transa has twice the power on the cutting stroke due to a special gearing arrangement. Special guides for each width of saw blade, 1/2" to 1", eliminate whipping, turning or cracking the blade, and acts as a cutting guide at the same time. Transa guns are used extensively in machine shops, assembly plants, fabrication industries, repair, installation and shipping departments.

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440-45 Gateway Bldg.
Minneapolis, Minnesota

and then talked myself out." I have only known of one salesman in my life who could talk himself into the order, then out of the order, then into the order again. He was the exception, but there are hundreds of salesmen selling machine tools today that dominate the interview with the customer by doing all the talking, selling the customer on the product and then unselling by talking too much and making too extravagant claims.

3. "I lost the sale because I didn't cover my sales story thoroughly. I forgot that to reach home plate you have got to touch each base." I had the experience

a few weeks ago of being out with a salesman who was so sure of receiving the order for some machines, because he felt that he knew the customer, knew the customer's wants thoroughly and therefore assumed the customer knew all about the equipment that he was selling. An aggressive competitive salesman, using good sales strategy in covering his sales story thoroughly, came into this customer's office and got the order for the machines. At the time that this job came up our salesman did not feel that this competitor was even in the running.

4. "I lost the sale because I did not know enough about my prospect's interests. I failed because I couldn't talk his language." I had a personal experience some years ago where I lost an order because I did not know enough about what my customer wanted. I went in-

to a customer's plant who had sent us an inquiry for a No. 4 Milling Machine, some years ago when we had the old No. 4 High Power and the No. 4 Standard Machine. Naturally, the No. 4 High Power was the easier machine to sell because it had more outstanding features than the old No. 4 Standard. So I immediately started to work on my customer with the idea that he should buy the No. 4 High Power. I did not ask him what he was to use the machine for. I did not ask him what size of job he was going to put on the machine. I just gave him everything I had on the No. 4 High Power.

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Threadwell Tools do many jobs



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Binding, for example, is a problem commonly referred to Threadwell. Often the trouble can be cleared up by the use of a *standard* Threadwell Tap, because of the ground radial relief behind the cutting face. In addition, flutes of Threadwell Taps are ground, polished, and of proper depth to allow easy passage of chips, and access for lubricants. Result: Elimination of breakage, more and cheaper holes per tap.

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The customer was thoroughly sold on the No. 4 High Power, but when he finally saw the price of the machine he said, "Why, I can buy a machine to do my job for \$2,000 less than that." Then I asked him what he was going to do on the machine and he said that the only use he had for the machine was for milling a keyway in shafts, and he needed range, not power, for this operation. Then I had to revert to the standard No. 4 Milling Machine which did not have nearly the number of features of the machine that I had been talking about, and the customer was thoroughly dis-

gusted with me because I had offered him something which did not have the design features of the machine that I had been talking about before. I knew then that I had lost the order and I knew it before I left the customer because he told me so. Now, if I had asked what the customer wanted to use the machine for, if I had interested myself in his problem so that I could have offered the correct machine for his job, I have every reason to believe that I would have sold him our machine.

5. "I lost the sale because I did not sell myself thoroughly enough to the buyer. I forgot that I am part of the package my prospect buys." A machine tool salesman is a long-range salesman. The buyer often buys from the salesman in whose honesty, integrity and sincerity he has implicit confidence.

6. "I lost out to a competitor because I made exaggerated claims about my product. My customer decided that I was a belief burglar, trying to sneak my way into an order through the second story of misrepresentation." No machine tool salesman lasts long using this type of strategy.

7. "I lost the sale because I got into an argument with my customer — an argument which I won. That is why I lost the sale."

8. "I lost the sale because I spent too much time knocking competition and not enough time selling my own quality and production story." A good bit of

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Fiske "MAGIC" Compound, when dissolved in water, cools, lubricates, produces a high finish and lengthens tool life. There is nothing else like it for milling, drilling, grinding, turning, sawing, threading, wire drawing and stamping. It is rust resistant, stays mixed and will not become rancid. Try it and see the improvement in your work.

There is a Fiske Lubricant for every metal working operation. Each is an outstanding product and results in more production, better finish and increased tool life. Let us solve your special problems. Write today to Fiske Brothers Refining Co., 135 Lockwood St., Newark 5, N. J., or 1506 Oakdale Avenue, Toledo 5, Ohio.



Established 1870

METAL WORKING LUBRICANTS

sales strategy on how to lose an order is to knock your competitor.

9. "I lost the sale because I did not generate enough desire for my product." Gentlemen, if there is one bit of sales strategy that I can impress on a machine tool selling organization, it is that sales strategy necessary to generate the desire to buy any machine tool. Never in the history of our country has there been such a tremendous value represented in the purchase of a machine tool in the way of returns to its buyer. There is no better investment today in the form of securities than a modern machine tool.

The one thing that we have missed in our industry, in my opinion, is the ability of our selling organization to generate enough desire for new machine tools to keep the average age of machine tools in this country at a reasonable level. I think it is an indictment of our ability as sales strategists that we should have in some of our large shops manufacturing both consumer and durable goods, machines that are 25, 30, or even 40 and 50 years old.

10. "I lost the sale because I did not plan my presentation carefully enough. I just dealt sentences rapidly off the top of my mind." A salesman who is selling a machine tool must have an organized plan in the presentation of his product so that his prospective buyer's attention can be maintained during the entire interview. He must have a concise presentation so that he can get his point across.

11. "I lost the sale to a competitor, whose price was lower — because I did not have enough facts to prove my product was worth the extra money." I wish, gentlemen, that you could see the excuses that are written on "lost deal" reports sent in by salesmen. "The price was too high." "The delivery was too long." These lost deal reports have everything on them except the real reason. The salesman never puts down, "I lost the sale because I didn't do a good job of selling." To lose the sale because your price is too high is an indictment of your ability to use the proper sales stra-

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Up to 1½"**

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Built to quickly
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drilled holes mean savings in
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QUICK SET-UP

The Yankee operator can
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tegy. It is an indictment of the salesman
for not doing a good job of selling.

12. "I lost the sale because I had neg-
lected my customer too long. A competi-
tor beat me to it because he was there
asking for the order." How many sales-
men of your acquaintance do you know
who only call on the customer when he
finds out that there is a hot deal pending.
And if he does not get the order he feels
very much put out because he wasn't
given an equal chance with the salesman
who had called on the customer regularly
and had given advice and service to the
customer over a period of time when

there was no busi-
ness on the hori-
zon. Gentlemen,
our customers buy
machines because
of the service and
the attention that
they get from the
salesman, not at the
time that they are
buying the equip-
ment, but during
the time in which
the equipment is
in operation in the
shop and he may
need advice or
counsel on his
problems.

13. "I lost the sale
because I wasn't a
good closer. I could
get the fish on the
hook, but I couldn't
land it in the boat."
One of the biggest
problems of our
sales organization
is the lack of abil-
ity to close the
deal; to ask for the
order; to get the
customer to sign
on the dotted line.
I have never known
of a salesman to
be thrown out of
a customer's office
because he asked
for an order. But
I have known of a
lot of customers
who would like to
have thrown the
salesman out of
their offices be-
cause the fellow did
not know when to
stop talking. The

sales strategy is to know the time to put
on the closing act, to put on the terminal
facilities of a sales interview, and to
ask in a proud and confident voice for
the order for the equipment which he is
selling. One of the biggest points in
selling is to know when to ask for the
order.

14. "I lost the sale because of a com-
plaint hanging over from a previous neg-
otiation between my prospect and my com-
pany — a complaint which I did not
handle skillfully." How many times have
we heard from our salesmen the fact that

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the order was lost because of some trouble that was experienced on one of our machines 5, 6 or 8 years ago, that the customer still had in his craw and remembered, it seemed, every time he was ready to buy a piece of equipment. Gentlemen a complaint never corrects itself. Complaints are only corrected by continuous vigilance on the part of the salesman. If a salesman has a complaint to handle he should make that his first order of business because a complaint in his territory on any of his equipment is never a sales asset.

We have enumerated here 14 reasons

why orders have been lost — 14 reasons why battles have been lost in our selling campaigns — 14 sales strategies that have misfired. What are we going to do about them? How can we correct them? What can we do concretely in the training of our salesmen and our selling organization to avoid losing these battles?

I believe, basically, there are certain sales strategies that are fundamental, that are applicable not only to the selling of machine tools but to the selling of anything that we use in our daily work. And this strategy has been outlined by Borden and Busse in a book they have published, entitled "How to Win a Sales Argument." If we apply the principles outlined in their book against the reasons for losing sales, that I have just enumerated, I think we can come up with a comprehensive general plan of should help us in our efforts to sell machine tools.

1. "Don't try to do all the talking yourself." How can you find out what your customer wants if you don't give him a chance to tell you? How can you find out what his needs are unless you give him an opportunity to answer your questions? How can you find out what his problem is unless you give him an opportunity to state his problem to you? Don't try to do all the talking yourself.

2. "Don't interrupt your customer." Give him a chance to state his problem. Make him feel that his profit is your

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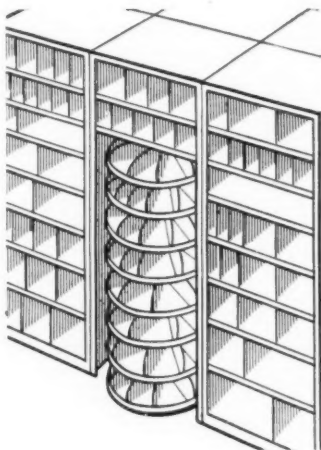
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greatest interest. You want him to feel that **his** problem is **your** biggest problem. Don't interrupt your customer.

3. "Avoid an argumentative attitude that is belligerently positive." Don't argue with your customer, because you may win the argument and lose the sale. Arguing with your customer is not being courteous, and courtesy is one of the basic principles of a successful salesman's makeup.

4. "In the first half of your interview with your customer, inquire rather than attack." Find out what your customer's problem is, what he wants to use the

machine for. Find out what you can do to help him in tooling up his job better. Find out what his problems are — make his problem your problem. Find out as much as you can about it so that you can give him the most intelligent answers to his problems that you possibly can. How can you find out what the customer wants unless you give him an opportunity to tell you, and how can you find out about his problems unless you ask him questions about his problems?

5. "When your customer makes a statement, restate clearly and vigorously in your own words the gist of each statement that your customer advances as soon as he advances it so that he will understand that you understand what he is saying."

6. And this, I feel, is the most important part of selling strategy. "Identify your main sales argument

with one key issue. Then stick to that issue and don't digress." Now every one of you has some definite feature on your equipment that you feel is outstanding above your competitors'. Some of you have what you feel are a large number of outstanding features on your machine. By applying the first five principles that I have stated here from Borden & Busse's book, you will have determined from the customer what the things are in your equipment that he is principally interested in. Apply the features in your equipment that most apply to his thinking, and although you have mentioned

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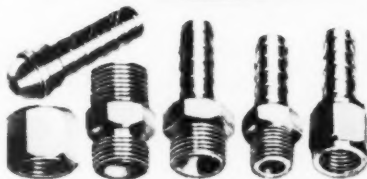


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all the features of your machine, pick out the one or two main features and hammer them home. And make that the big issue in the sale of your product. Find out by inquiry the thing that your customer is interested in. Remember that he is a human being, that he has the same basic likes and dislikes that you have, that he thinks pretty much as you do; and then in finding out what he likes, apply the features that come nearest to it and stick to that main issue.

So selling strategy breaks down into two points: First, you have the sales

army in which you plan a strategy, and in that sales army you want people who will live up to the three basic selling qualifications I have stated in the beginning: sincerity, courtesy, and service. The sales army must be made up of self-starters, men who are continually dissatisfied with the progress that they are making and their company is making, men who will do the job today and not leave it until tomorrow, salesmen who will do things not expected of them.

Then as sales manager and sales executive, you must train your army so they can apply the sales tactics that will eliminate lost-deal reports; or if there are lost-deal reports, they will not be based on the fourteen reasons for lost sales that I have mentioned. By continual application of the six principles of selling strategy, your salesmen will be their own strategists and can shift

the strategy, whenever they are in a sales battle, to get the order. End of Lecture No. 14.

* * *

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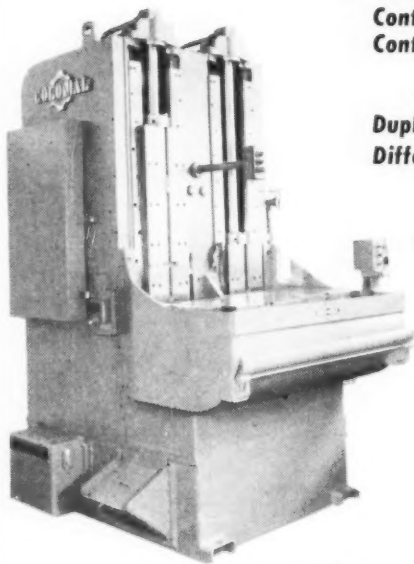
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Lecture No. 15 **METHODS OF APPROACH TO CUSTOMERS**

by

E. B. MacDonald

Vice President, Machine Tool Div.,
Syracuse Supply Co.

THEY'VE GOT TO LIKE YOU

Does your prospect like you? Are you making it easy for him to gain a favorable impression of you as a person, or are you putting your worst foot forward? Making a good impression, not only the first time, but the second, third, fourth and fiftieth time will do much toward getting the order. Remember, as a salesman you're dealing with people first, machines second.

TO MY subject I would like to add a subtitle: "Knowledge is Power." There is nothing new or startling about this although I might give it somewhat of a new twist by saying, "Knowledge is Power when the Knowledge is put to work".

You will understand that my conclusions are based not only on over twenty years of personal experiences in selling and sales direction but also from the ac-

cumulated experience of sixty-five years that our company has successfully operated in the distribution of mechanical devices. Reference to these experiences is simply to emphasize points brought out. During this time I have taken several training courses, all of which were good, but some of course, better than others. Any training requires a sincere desire on your part to try and understand what is being taught and you get out of it

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just about what you put into it in your desire to understand, appreciate and apply ideas advanced. In one of these courses a lecturer stated principles of unimpeachable accuracy and principles that should always be followed implicitly.

How did he evaluate these principles? From personal experience as a salesman? From some salesman or sales manager? From some noted economist? Some treatise on sales? No, not as we generally interpret the above terms. His Bible, so to speak, on methods of customer approach, which is another way of saying "human relations," was literally the Bible.

efforts were not appreciated, but by and large most people will more than return your offerings.

One more thing we can learn from this Book and that is — YOU AND YOU ALONE ARE RESPONSIBLE FOR THE WAY THE OTHER FELLOW FEELS TOWARD YOU. You probably have several cases in mind that you could cite that would disprove that statement but let's take a practical application and see if it is not generally true. Suppose you did not know me and I had never met you, and some mutual friend introduces us. Or suppose that I, as a sales-

Is that startling to you? Does it seem like a peculiar place to learn how to sell machine tools? Let's look at just a few of its well-known teachings, and see how we can apply them to selling machine tools.

First, - "Whatever ye would that others do unto you, do you even so unto them." What's wrong with that as a basis of customer approach?

Second, - "Cast your bread upon the waters and it will return to you manifold." Our modern version of this is "If you really throw yourself into your job whole - heartedly, without reservations, you will be amply repaid."

Third, - "It is more blessed to give than to receive, because it is in the giving that we receive." Did you ever do something really nice for anyone that they, at some time or another, did not try to do more in return? I mean the majority of people. To be sure, you can pick out isolated cases where your

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man, call on you, a customer. When I leave, you consciously or unconsciously feel, "Well, I hope he never calls again — there's something about him I don't like." Who is to blame? Are you to blame? Did you have some pre-conceived dislike for me, never having seen me before? No — something I did, or said, or didn't do or say, some mannerism or attitude created that feeling of dislike or distrust. The reverse reaction is just as true. I ask that you think about these things seriously and bear them in mind as we go on with our subject.

your business is and if the receptionist has no idea to whom to refer you, suggest the Master Mechanic, Superintendent, Tool Supervisor, or Plant Manager.

If the plant has no one specifically designated to purchase machine tools, or if the receptionist asks you to see the Purchasing Agent, even though you may think he can be of no help to you, see him and state your case. Nothing can be gained by being coy or sensitive about your mission. If you are ashamed of yourself, your company, or your product, you are licked before you start.

Remember, you are a guest at the

Knowledge of how to approach a customer is power to persuade him to think your way. First, we must have the knowledge of whom to approach in every plant, whether it be President, Master Mechanic, Purchasing Agent, Tool Supervisor, or all of them.

Most sales organizations have this information available if the territory has previously been covered and if their prospect list has been kept up to date. If the information is available the list should be followed, at least until such time as you are very familiar with the plant personnel and learn definitely that someone else should be called on.

If on the other hand, you are in virgin territory and you do not know whom to contact, and have no way of finding out except to call at the plant and ask the receptionist, then state clearly your name, the name of your company, what the nature of

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plant and you are after information, so don't try to "bull" your way in to the disgust of everyone encountered.

Rome wasn't built in a day, and you may not get the correct information or all the information you want on your first visit, but friendly persistence will eventually get you in touch with the right man. In some plants this may take months, even years, but don't forget that once you're "in" the competitive salesman will have just as hard a time as you had, and if he makes tactical errors in his approach he may never get in.

Never overdress or appear foppish.

3. Always approach your customer in a courteous way. Eventually you may be able to approach him more informally but until you are well acquainted you never make a mistake of being too informal. Familiarity often breeds contempt, so treat your customer with respect, even though the previous night you may have met him on much more familiar terms. If you do not know him well enough to call him by his first name, then address him and "Mr. So and So," never by his last name alone.

Methods of customer approach vary infinitely in detail, probably in proportion to the number of salesmen calling, times the number of men called on. Each salesman must follow these details according to his own personality and his customer's personality.

Basically, the fundamentals of proper approach can be stated and strict adherence to these fundamentals will give you persuasive power. The following tabulation is not necessarily in order of the importance of these principles, as each one carries its own significance:

1. If your call is by appointment, be prompt, or if anything, a little ahead of time. If you are unavoidably delayed, phone your customer and explain. There is nothing more annoying to a busy man than to set aside a definite time in his work only to have it wasted by your not showing up.

2. Always present a neat appearance.



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4. Approach all customers with a sympathetic desire to understand his problem. Listen attentively, ask intelligent questions to clear up any points of doubt. Be sure you understand the problem. Do not give snap judgements or smart-aleck answers only to find later that you didn't know what the customer was after, or you did not know what you were talking about.

You may think you know, or you even may surely know the answer before your customer gets to the point, but if in giving him the answer you embarrass him or belittle him, or unintentionally inti-

mate that you are very smart and he is ignorant, you create an obstacle that is hard to overcome. Never be afraid or ashamed to admit you don't know, get the facts, submit them to your engineers and when you give your answer you will eventually impress your customers with the idea that you can be relied upon. From our own experience with many salesmen dating back over sixty years, we conservatively estimate that 70% of our orders for capital goods are placed because the buyers had confidence in our firm and particularly in the salesman.

Let us examine the reasonableness of this statement. We will assume the machine in question costs \$10,000. Your selling tool may be a well-edited catalog, a photograph or only a blue print. We will assume you have at least one competitor. His selling tools may be better or worse than

yours. If it is a new type of installation for the customer, you are faced with the task of convincing your client that everything you tell him in regard to the savings he can make with your machine will be found accurate. If he feels you are high-pressuring him, overpromising performance of the machine, or are flippant, he will not only discount your statements but will also discount the catalog you leave with him, no matter how well it is prepared. The confidence he places in your statements depends on your own sincerity.

5. Sincerity is of the utmost importance

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cisely and when your subject has been covered, thank him for his time and attention and leave assuring him of your hearty co-operation if he has any additional questions in the future, or say that you will get in touch with him immediately if you gain more information.

8. Do not approach your customers apologetically, without purpose. How many times you have heard a salesman say "I was in the neighborhood and just dropped in to say hello," or "I haven't anything to tell you but wondered if you wanted to see me about anything," or some equally inane statement. Go in objectively, have a new catalog to show him, a new idea to give him, but be sure they are something he could conceivably use and when you have given him the information, leave; don't hang around boring him with your golf score. Do this and you will be surprised how

soon he will want to see you about buying a machine.

9. You must not only make your customers like you, but respect you as a man; respect your knowledge of your product and your company. Don't promise much and do little. Do what you promise to do. If you cannot do something that he may want done, explain clearly and regretfully why that is the case. End of Lecture No. 15.

In response to many queries, the complete NMTBA lectures will be issued in booklet form after they have appeared in the BLUE BOOK.

and it must come from within and be genuine. It is not something that can be put on and off like a coat because an assumed appearance of sincerity is worse than useless.

6. Friendliness must be a natural characteristic. This should be a sincere liking for people, including the ability to see and appreciate their good points and to understand and overlook their bad traits.

7. Never drag your interview out to the point where your customer feels he would like to throw you out. The length of your call is not necessarily indicative of its quality. State your case clearly and con-

News of the industry.....

Second Triple Mill Supply Conference Booth Program

April 25 and 26 at Cleveland Public Auditorium

Following the pattern of the Conference Booth Program, set so successfully during the 1948 Triple Mill Convention, in Atlantic City, the 1949 convention will follow the same Conference Booth Program at the Cleveland Public Auditorium. The joint meeting of the American, Southern and National Supply and Machinery Distributors Association, which is the opening meeting, will be held in the Music Hall in the Public Auditorium on Monday morning, April 25.

Approximately 300 booths will be occupied by the members of the various associations. There definitely will not be permitted any equipment, parts, cut-out models, or anything which would indicate that this effort was to be anything other than a Conference Booth Program. Booth hours are: Monday,

The Dayton Rubber Mfg. Co.
Templeton, Kenly and Company
U. S. Expansion Bolt Company, Inc.
American Screw Company
The Fairbanks Company
National Screw and Manufacturing Co.
Clemson Bros., Inc.
Smith Welding Equipment Corp.
Homestead Valve Manufacturing Co.
American Machinst

April 25 and 26, 1:00 P.M. until 6:00 P.M.

Last year's show was particularly successful. Top management actually manned the booths and distributors were afforded opportunity to spend time with their numerous manufacturing friends to secure their advice and counsel, while the manufacturers learned considerable from the distributors concerning new markets and trend of business by areas, and there was further opportunity to discuss other policy matters.

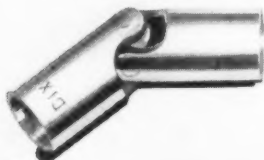
Until press time the exhibitors and their booth numbers had not been made available; however, we are listing here the members of the association, a large percentage of whom will probably be in attendance at the Second Triple Mill Conference Booth Program:

Independent Pneumatic Tool Co.
Industrial Distribution
Reliance Electric and Engineering Co.
The United States Electrical Tool Co.
Columbus McKinnon Chain Corp.,
Chisholm-Moore Hoist Corp.
John A. Roebling's Sons Company
Diamond Expansion Bolt Co., Inc.
Reed Manufacturing Co.
The D. T. Williams Valve Company

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National Tube Co.
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Armstrong-Blum Mfg. Co.
Oliver Iron and Steel Corp.
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Corning Glass Works
The Dumore Co.
Coqsdill Twist Drill Company
United States Rubber Co.
The American Pulley Company
Gardner Publications, Inc.
Millers Falls Company
Putnam Tool Company
Hy-Pro Tool Co.
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Johnson Belting Company, Inc.
The Bassick Company
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The B. F. Goodrich Company
Lowell Wrench Company
American Swiss File & Tool Co.
Alexander Brothers
Pittsburgh Pipe & Coupling Co.
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Aluminum Industries, Inc.
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American Manufacturing Company
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Pittsburgh Screw and Bolt Corp.
Lincoln Engineering Company
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Clover Mfg. Co.
David Round & Son
The Buda Company
Utica Drop Forge & Tool Corp.
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Fiske Brothers Refining Co.
The Cleveland Cap Screw Company
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The Vincent Steel Process Company
Western Automatic Machine Screw Co.
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The American Fork and Hoe Company
Victor Balata & Textile Belting Co.
The Deming Company
Graton & Knight Company
Super Tool Company
Dodge Manufacturing Corp.
Buffalo Weaving & Belting Co.
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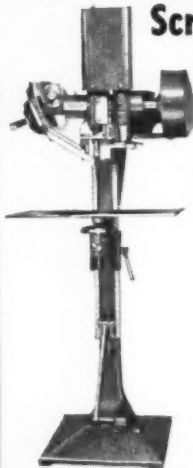
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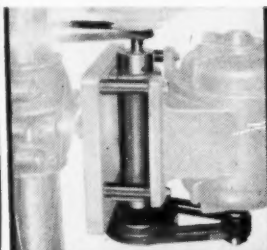
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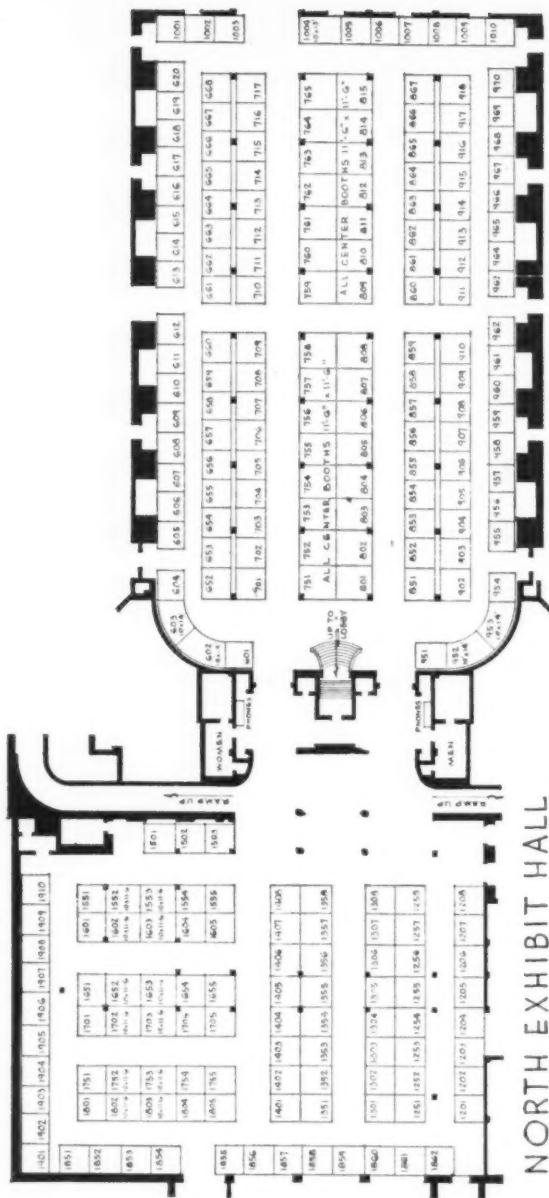
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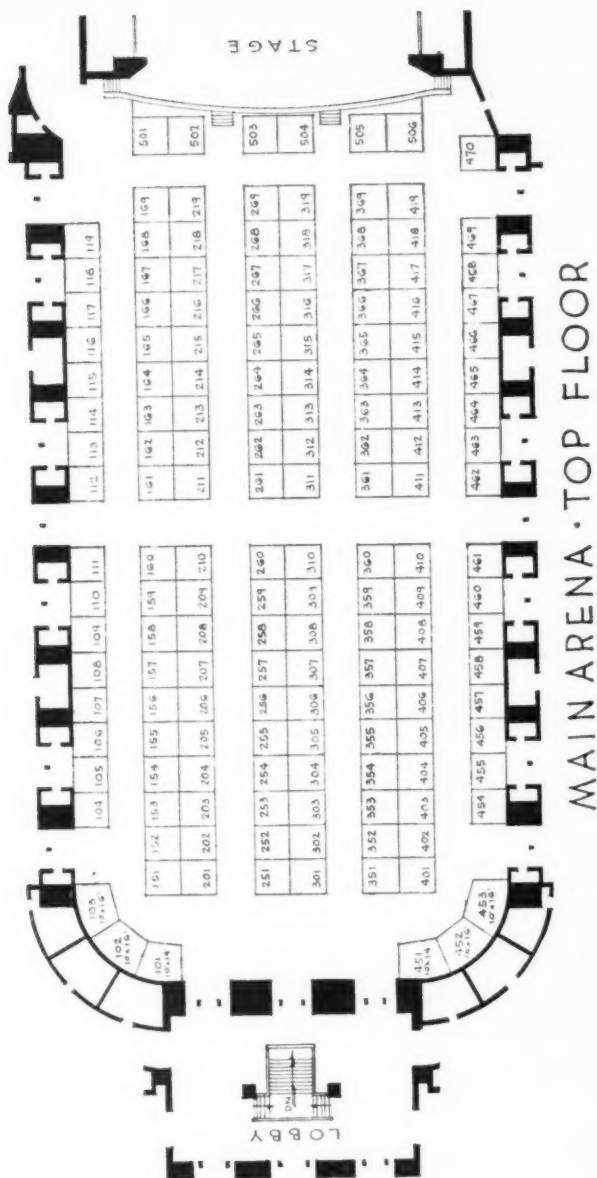
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Floor Plan of the Cleveland Auditorium,

GEORGE GORTON MACHINE CO. RECEIVES 1948 NATIONAL LABOR RELATIONS AWARD

The George Gorton Machine Co., Racine, Wisconsin, recently experienced the unique distinction of being selected, out of 7000 business firms, for the 1948 Award of the Labor Relations Institute of New York for "Outstanding Achievement in Industrial Relations."

On February 24, Ola C. Cool, Director of the Labor Relations Institute, presented a bronze plaque to George Gorton III, executive vice president and general manager of the George Gorton Machine Co., and to Carl Wohlin, chairman of the Union Committee. The ceremony took place on the assembly floor of the Gorton plant, and was witnessed by all of the Gorton employees and their immediate families.

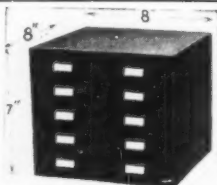
In making the presentation, Cool explained that the award committee had screened the names of many manufacturers in order to select one which had demonstrated beyond any doubt, an outstanding harmony in its industrial relations for 1948. He stressed the fact that the award can be considered a no-



Left to right: George Gorton III, executive vice president and general manager of the George Gorton Machine Co., accepting plaque with Carl Wohlin, Union Committee Chairman, from Ola C. Cool, director, Labor Relations Institute.

table tribute, inasmuch as the Labor Relations Institute serves seven thousand business firms in this country and abroad.

In accepting the plaque for the company, George Gorton III replied that he was happy because of the honor being paid to the Gorton Company, and that he accepted the award for all those who contributed toward earning it, from president to sweeper; he fur-



Pat. Pend.

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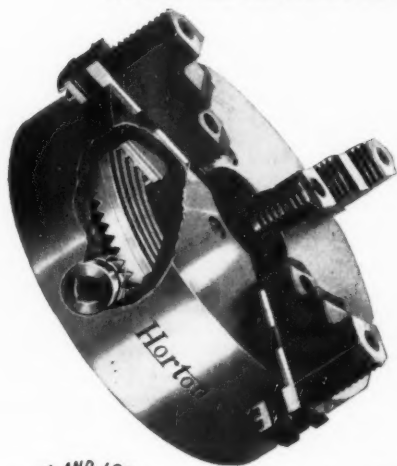
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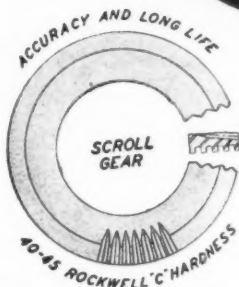
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LET'S LOOK INSIDE A HORTON SCROLL UNIVERSAL CHUCK



The Scroll gear is the heart of the Universal Scroll Chuck.

Horton hardens and draws their scrolls to 40 - 45 Rockwell "C". By doing the finish machining and grinding on the scroll threads and bore after hardening, the ultimate in strength and accuracy is obtained. Users may expect a long accurate life because of this and many other Horton "extras".

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HORTON ALSO CARRIES A COMPLETE LINE OF INDEPENDENT CHUCKS, COMBINATION CHUCKS, TWO-JAW CHUCKS, ELECTRIC POWER CHUCKS AND DRILL CHUCKS.

Regularly sold through industrial distributors.

THE E. HORTON & SON CO.
WINDSOR LOCKS, CONN. U. S. A.

ther expressed his conviction that an award of this nature would not be possible without the wholehearted cooperation of every individual in the company.

The master of ceremonies during the presentation was Larry Sorensen, president of the Belle City Chapter of the International Association of Machinists, who stated that he, as a Gorton employee as well as a union official, believed that this event symbolized the highest type of cooperation between management and union members, and that every individual Gorton employee could feel that he, personally, was responsible for the honor being shown the company as a whole.

Frank H. Lovell, managing editor of the Racine Journal-Times, spoke briefly as a member of the community at large. He stated that he firmly believed that everyone present was watching industrial history in the making, since he knew of no other similar occasion of award presentation ever having taken place previously.

P. L. Siemiller, general vice-president of the International Association of Machinists, also spoke from the viewpoint of the union official. He stated that the company throughout the nine states served by his office was as deserving of the award as the George Gorton Machine Co.

A company spokesman stated that this award was gratifying to both management and employees because it is the first of its kind ever presented to any company, and it is national in scope. The significance of this event lies in the fact that many publications have traditionally publicized all incidents and situations where conflict has occurred between unions and management.

The spokesman continued, saying that this award certainly disproves such thinking. Here the union and management are not only getting along harmoniously, but are doing such a good job of it that the George Gorton Machine Co., among thousands of other manufacturers, was given national rec-

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Even a novice can accurately grind straight or spiral flutes from solid stock on the Wardwell Automatic Flute Grinder.

Grinds taps and reamers from 1/16 to 2"; also teeth in milling cutters, angular cutters.

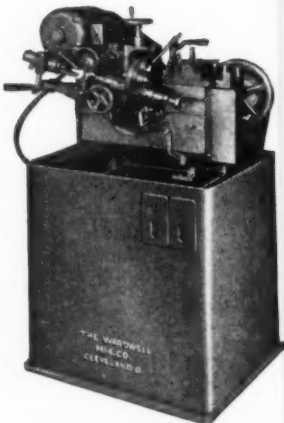
Sharpens saws in gangs up to 3 3/4" long, with diameters ranging from 1/2" up to 8".

Grinds and resharpens reamers from 1/6" up, with spacings of 2 flutes and more.

Can be adapted to many special grinding problems.

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Produces Precision Tools With Unskilled Labor**



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ognition. This should set a pattern and offer an incentive for better industrial relations wherever this article is read.

An informal dinner followed the presentation ceremonies at which were representatives of education, management, labor and various civic organizations. All Gorton foremen were present, as were members of last year's and this year's Union Committees. During the short talks by various guests, Willard D. Stansil, Executive Secretary of the Racine Manufacturers' Association, paid special tribute to Carl Lockrem for his contribution to the fine industrial relations record of the Gorton company in his capacity as Director of Industrial Relations. As a fitting close, Dr. A. E. May, assistant director of the University of Wisconsin, Racine Extension Division, wrote the following in a letter to the Gorton company on the day after the ceremonies: "... as the evening progressed it became increasingly obvious that down underneath was a solid core of mutual trust and respect. At my table

were several of the union members... (who) shared the pride of working for and in an outstanding organization. There was no trace of "chip on the shoulder" feeling that often accompanies distrust, no impression that this was a paternalistic display of what the company was doing for its employees.... I found that I, too, felt a surge of pride in the thought that I lived in a community and a country in which such a demonstration was possible. It left me with a feeling of confidence in the future, for if the obvious benefits to both labor and management in an organization like yours can be brought to the country's attention, it seems inevitable that others must follow in your footsteps."

G. E. PLANS NEW SALT LAKE CITY SHOP-WAREHOUSE

Greatly expanded repair, maintenance, and warehousing facilities for increasing service on General Electric apparatus in the states of Utah, Idaho, Montana, and Nevada, will be established in Salt Lake City by the G-E Apparatus Department, it was announced recently by B. C. J. Wheatlake, manager of the company's Salt Lake City Office.

The facilities will increase warehouse space nearly 50% and will more than double the present capacity for service and repair of motors, generators, transformers, control devices, and assembly of special switchgear, Wheatlake said.

The new facilities coupled with those opened in Denver in 1946 will give the Rocky Mountain area "one of the most up to date G-E service organizations in the country," according to Wheatlake. G. E. has 29 such installations throughout the country.

The Salt Lake City service facilities will be housed in a new service shop and warehouse building, scheduled for construction this spring and planned to be completed by late summer.

J. A. McDonald, superintendent of the present shop, and J. C. Davis, warehouse supervisor, will continue in their positions in the new building.

BAUMBACH

THE DIE SET AUTHORITY



SURFACE GRIND TO ASSURE PARALLELISM AND HIGH FINISH

DOWELED AFTER ALIGNMENT

All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

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H. B. ROUSE & CO. CELEBRATES 50th ANNIVERSARY

Founded at the end of the 19th century, H. B. Rouse & Co., Chicago, has now joined the select group of American business firms which have reached the half-century mark. The Rouse firm has been a world leader in supplying composing equipment to printers in every nation.

During the war, production requirements compelled the company to develop a hand miller entirely different from any other. Company officials believed the new device might help production in other plants. Descriptive circulars were mailed out, demand developed and the company found itself in the machine tool field. A series of attachments have increased even further the hand miller's range and productive ability. Today, the machine is widely used throughout industry.

H. B. Rouse & Co. has sailed serenely through this decade of labor unrest. Harry Knoll, president and son of one of the founders, is proud that "one third of our employees have been with us over 30 years; two thirds for over 20 years."

Walter Sittig, secretary and one of the founders, believes that the company's strength depends upon satisfied steady customers. "Just consider," he says, "that most of the dealers who started with our new company 50 years



Harry Knoll



Walter Sittig

ago are still our good customers. Furthermore, 15% of our dealers have been on our books over 30 years; 81% over 10 years. Bearing in mind this company's steady growth, you can see why we face our second half century with confidence."

KENMORE METALS EXPANDS PLANT FACILITIES

The Kenmore Metals Corporation is increasing its plant capacity approximately four times through the acquisition of a long term lease on part of the property formerly occupied by the American Brake Shoe Foundry, 380 9th St., Jersey City, N. J., according to a recent announcement by Herbert Kenmore, president.

He said that the Company's present production facilities at Warren, Pennsylvania, will be moved to Jersey City and that plant expansion is the result of increasing demand for new types of nickleed steel wires introduced a few years ago. He also reported that prices of these wires, known commercially as fernicklon, will be reduced approximately 25%, which will make them actively competitive to tin and zinc coated wires.

AMERICAN PUBLISHER FOR EUROPEAN TECHNICAL BOOKS

The Newton Publishing Corp. has recently been established at 114 East 32nd St., New York 16. On January 1, 1949, it became sole U. S. agent for the famous Swiss publishing house, Verlag Birkhauser, Basle. The books already available represent the latest scientific and technical works, in German, written by the leading scientists in Europe. The list includes standard works on mathematics, chemistry, biology, physiology, geology, astronomy, engineering, architecture, textiles, and biochemistry. In addition, there are many of the most important scientific periodicals appearing in Europe today, including "Experientia", and "Elemente der Mathematik".

These are essential books for every scientific worker and library; they can be obtained at booksellers or direct from the Newton Publishing Corp., who will send a catalog on request.

W. C. HIPPLE, WESTINGHOUSE EXECUTIVE RETIRES

William C. Hipple, who managed the Trenton (N. J.) plant of the Westinghouse Lamp Division for almost 30 years, retired January 31, 1949, after 47 years with the Division. He was honored by his colleagues at a dinner in the Essex Club, Newark. Mr. Hipple was in charge at Trenton from the day the plant opened in 1917 until September, 1946, when he came to the Bloomfield, N. J. plant as staff assistant to Ralph C. Stuart, vice president. In this capacity he aided in planning a plant expansion program and worked with foreign lamp licensees of the Westinghouse Electric International Company.

Mr. Hipple joined the Sawyer-Man Company, forerunner of the Lamp Division, as a foreman in its carbon filament lamp plant on West 23rd Street, New York, in January, 1902. He was transferred to Bloomfield as general foreman when Westinghouse moved its lamp manufacturing there in 1907 and later became assistant superintendent. When the New York plant was reopened in 1912, Mr. Hipple returned there as superintendent, moving to Trenton five years later. For his outstanding service, the Company conferred upon him its highest award, the Westinghouse Order of Merit.

Mr. Hipple was born in Paris, France, of American parents. His father had displayed electric lamps for Thomas A. Edison at the Paris Exposition in 1880 and had remained in Europe to help open lamp factories in France and Germany.

LANDIS OPENS INDIANAPOLIS OFFICE

The Landis Tool Company, Waynesboro, Pa., manufacturers of precision cylindrical grinding machines, announces the opening of a direct sales and service office in Indianapolis at 709 East 38th Street, with A. J. Jones as district manager. This territory will include all of Indiana south of Indianapolis and north as far as Logansport, Huntington and Fort Wayne.

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"Industrial"

COMPENSATING

SPACERS



For quick-easy adjustment on strippers, pressure pads, etc. Fit shoulder and standard screws. Precision made of hardened spring steel. Save making spacers, wire rings, shortening screws, etc.

PRICES per 100 f.o.b. CHICAGO

Size	ID	OD	Thickness
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3/4"	.750	1.000	\$1.52 \$1.95
5/8"	.625	.875	1.43 1.75
1/2"	.500	.750	1.08 1.35
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Save time . . . Money . . . Instant stock check-up "INDUSTRIAL" DRILL ROD RACKS

Pick sizes and lengths instantly. Save waste. Fast selection of long or short pieces. Fully indexed in Numbers, Fractions and Decimals. Durable all steel V-slot construction.

NUMBER SIZE — Holds 8 to 10 each of Rods from 1 thru 60, and 3" to 36" lengths 54" Long x 30" High. \$25.00
F.O.B. Chicago.

FRACTIONAL SIZE — Holds 5 to 10 each of rods 1/32" thru 17/32" by 64ths. Fractional and Decimal index. 46" Long x 30" High. \$23.00
F.O.B. Chicago.

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INDUSTRIAL TOOL WORKS, 1348 W. Henderson St., Chicago 13

McNEIL MACHINE & ENGINEERING CO. BUYS OHIO FIRM

The Cleveland Crane & Engineering Co., Wickliffe, Ohio, has been purchased outright by the McNeil Machine & Engineering Co. of Akron, Ohio. Plans have been made to continue operating Cleveland Crane as heretofore, with no changes in over-all management, organization, or policies. For all practical purposes, the company name will remain the same. The only change contemplated is merging the two companies with the thought that later on stock of the combined companies will be offered to employees and the public.

The Wickliffe, Ohio, firm was organized in 1899 as the Cleveland Crane and Car Company, and from the start has been engaged in the manufacture of traveling cranes, still an important part of its business. In 1919, the Cleveland Tramrail line of overhead materials handling equipment was developed. This has become the most important from the standpoint of dollar sales of Cleveland Crane products.

In 1931, the company began diverging beyond the materials handling field and developed a complete line of press brakes, known as Steelweld Bending Presses. In 1945, a line of heavy



C. F. Safreed



H. T. Florence

metal cutting machines, known as Steelweld Pivoted-Blade Shears, was introduced; both met with instant approval.

The Akron concern was formed in 1862 as the J. C. McNeil Company. It

LOOK OUT FOR SAW TEETH! !

Yes, most popularly advertised horizontal band saws start cut over corners . . .

Strip teeth
Cut crooked
Spoil work

NO CUT-OUT OF SECTION POSSIBLE

HORIZONTEX
Parallel cut-out and cut-off metal cutting bandsaw.

The right way is the **HORIZONTEX** Way!

PARALLEL STARTING WAY

RETRACTABLE FILING MACHINES
(4 models)

PARALLEL & AUTOMATIC STOP - ON DESIRED DEPTH OF CUT-OUT.

FILING SAWING LAPPING

ULTRA PRECISION

ANGLEMASTER SINE VISES

IDEAL TOOL & DIE CO., INC. 735 Congress St. Schenectady 3, N.Y.

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ny. It

is operated by C. F. Safreed, president; A. S. Michelson, vice president and treasurer; T. Henry Williams, secretary; and Frank H. Jennings, assistant secretary-treasurer. The present owners acquired the firm in 1936 and since then it has had a phenomenal growth, and is one of the leading manufacturers of rubber-working machinery.

Because of the similarity in manufacturing facilities required for the products of the two companies, they have much in common. By combining efforts and resources and interchanging ideas and experiences one will be an asset to the other, enabling developments at a rate even greater than before.

Herbert T. Florence, president of Cleveland Crane, and executives now associated with him, will continue to operate the business as previously.

Raymond L. Smith Associates, New York, has named the **Davidson Industrial Contracting Co.**, Brooklyn, N. Y. as service representative.

C. T. M. A. ELECTS GAIRING

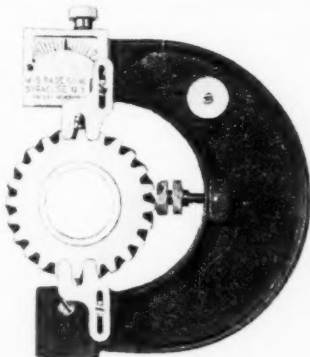
Emil Gairing, president of Gairing Tool Company, Detroit, was elected elected president of the Cutting Tool Manufacturers' Association at the fifth annual membership meeting, held in Detroit. He succeeds D. E. Van Deusen, president and general manager of Kelly Reamer Company, Cleveland.

Elected vice president of the Association was Norman Lawton, works manager, Star Cutter Company, Detroit. R. S. Spencer, president, Detroit Boring Bar Company, was elected treasurer, while Harry J. Merrick continues as executive secretary of the C.T.M.A.

Elected to serve the next three years on the Board of Directors of the Association were Walter F. Guller, president, Fuller Tool Co., Detroit; E. J. Kaiser, manager, Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.; R. S. Spencer, president, Detroit Boring Bar Co., Detroit; and Robert H. Wolfe, vice president, Arrow Tool & Reamer Co., Detroit.

INDICATOR GEAR GAGE ACCURATE • DEPENDABLE

In 5 to 10 seconds your operators can easily and accurately check pitch diameter without disturbing the set up! The element of human error is entirely eliminated with the new Indicator Gear Gage. Simple to operate, each gradation on the gage represents .001 movement of the contact point. Equipped with American Gage Design Standard Adjusting and locking device. Available in sizes to handle $1\frac{1}{2}$ " to $11\frac{1}{2}$ " O.D. gears. Low in cost. **Precision Built** for long use. For quotation, indicate gear O.D. pitch diameter, ball size and face width. Write or wire today.



M. G. GAGE CO.
107 N. FRANKLIN ST.
SYRACUSE 4, N. Y.

Also manufacturers of Syracuse-Style Square Pin
and AGD style Adjustable Limit Snap Gages.

INDEX OF NEW ORDERS AND SHIPMENTS OF MACHINE TOOLS

Base—Average Shipments 1945-1946-1947=100 %

Date	New Orders (Total)	Foreign Orders (Included in Total)	Shipments (Total)	Ratio Unfilled Orders to Shipments
1947				
July	81.1	16.7	65.2	7.4-1
Aug.	62.1	14.6	63.6	7.5-1
Sept.	63.7	14.7	77.0	5.9-1
Oct.	81.0	16.0	94.8	4.6-1
Nov.	75.6	11.5	84.7	5.1-1
Dec.	81.1	14.8	98.4	4.1-1
1948				
Jan.	83.1	14.0	75.3	5.4-1
Feb.	77.3	12.7	87.1	4.7-1
Mar.	86.3	16.1	83.6	4.6-1
Apr.	86.3	14.1	82.0	4.7-1
May	73.5	11.4	82.6	4.5-1
June	83.4	11.9	94.4	3.8-1
July	74.0	13.3	62.4	5.9-1
Aug.	73.7	13.6	69.8	5.2-1
Sept.	73.1	11.6	84.7	4.3-1
Oct.	67.4	14.0	80.4	4.2-1
Nov.	72.2	18.1	76.2	4.4-1
Dec.	76.7	16.2	96.9	3.2-1
1949				
Jan.	p 87.1	p 21.9	p 68.8	p 4.6-1

p-*Preliminary figures*

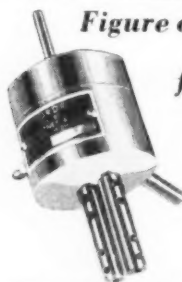


Figure on ... **TAPORDRIL** for Close Center

- ★ **DRILLING**
- ★ **TAPPING**
- ★ **REAMING**
- ★ **COUNTER SINKING**

The new **TAPORDRIL** is a sturdy, high speed driving unit, designed for drilling or tapping two or more holes on close center work.

Used in a drill chuck or tapping attachment, it provides an efficient and economical means of drilling, reaming, tapping or counter sinking.

Sizes may be ordered from $\frac{3}{8}$ " to $\frac{1}{2}$ " centers for Model "F" or $\frac{3}{8}$ " to $\frac{1}{2}$ " for Model "R". Pictured is the Model "F" which runs in the same direction as the driving spindle.

All models are made on fixed centers and are not variable, thus giving good straddle bearings for long life.

Gears are specially cut from alloy steel and housings are of the best bearing material.

Needle bearings are available in some sizes.

Several good territories available.

Write for complete literature.

Try **TAPORDRIL** on your next job for extra Profits

L. E. OTTNEY & CO.

3650 West Eleven Mile Road

Box 469 LINCOLN 3-5195 Royal Oak, Mich.

DIHEL ACQUIRES VONNEGUT MOULDER

Fred A. Collinge, President of The G. M. Diehl Machine Works, Inc., announced Feb. 16th that his company had acquired all the assets and manufacturing rights of the Vonnegut Moulder Corporation, Indianapolis.

"We have felt for a long time the need for a moulder in our line of woodworking machines," said Collinge, "not only to make our line more complete but . . . to better serve the woodworking industry. We recognize the outstanding reputation and dependable performance of the Vonnegut Moulder.

. . . With the combined engineering skill of both companies, we will continue to build into this moulder the same high quality and dependable workmanship as in the past and will strive to improve its design and performance whenever possible. . . ."

All new moulders manufactured by Diehl will be known as the "Diehl-Vonnegut" Moulder and will be sold through leading woodworking machinery dealers.



This Tapping Head *CUTS PRODUCTION COSTS!*

Reduce labor costs and cut down tap breakage with Procnier High Speed Tapping Equipment. Check these unusual advantages!

Accurate, high speed tapping. Procnier tap heads will give you cleaner, sharper threads . . . in less time, with less spoilage.

Fewer broken taps. Friction clutch regulates tap driving pressures, operators quickly detect dull or "loaded" taps . . . avoiding costly tap breakage.

These and many other **proven exclusive** features assure you of fast, accurate tapping . . . reduced production costs.

Cross section of tap holder (at left) shows how tap is held by the round, driven by the square . . . tap shanks are never "chewed up."

Exclusive
"Tru-Grip"
Tap Holder
is lighter,
smaller in
diameter.

WRITE FOR
FREE
CIRCULAR

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Safety Chuck Company

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Chicago 6, Ill.

Procnier Safety Chuck Co.,
14 S. Clinton St., Chicago 6, Ill.

Gentlemen: Please send me your illustrated brochures which give complete prices and specifications on Procnier High Speed Tapping Heads & Machines.

Name.....

Address.....

City.....Zone.....State.....

EMERGENCY ASPHYXIATION APPARATUS

A new apparatus for treating pulmonary disorders resulting from exposure to certain chemicals, gases or superheated air in industrial processes is announced by Mine Safety Appliances Co., Pittsburgh. It also is used for emergency cases of asphyxiation.

Developed during the war to save the lives of aircraft crew members who were wounded and required resuscita-

tion at high altitudes, commercial distribution of the "M. S. A. Pneophore" has been withheld until now to permit further development and widespread clinical testing.

A portable instrument, consisting mainly of three valves, two gauges, rubber tubing and facepieces, the Pneophore differs from a resuscitator in that it administers oxygen with intermittent positive pressure only. Suction that could damage lung tissues or other parts of the respiratory system is eliminated. The instruments are used on any oxygen cylinder with a standard thread.

The Pneophore supplants manually applied artificial respiration. If the subject is conscious, the device follows his natural breathing pattern. If breathing has been arrested, the valve operates on a regular cycle, interrupting oxygen flow automatically when the predetermined pressure is reached. Exhalation is by passive recoil.

The "heart" of the instrument is a double-action valve that converts continuous positive pressure to intermittent positive pressure. Although this valve requires no adjustment to operate, there is a low pressure regulating valve that provides an adjustable outlet, from the 50 lb. p.s.i. reducing valve, to a range from 0 to 30 cc. of water. This enables a physician to regulate the volume of oxygen he deems satisfactory for the patient's lung capacity.

SCHERR aids to precision — production

**GUARANTEED ACCURACY
AT A NEW LOW
IN COST**



**SCHERR
MICROMETER**
with 1/10,000th
Vernier \$7.25

Here is the last word in development in a measuring tool every mechanic can take pride in owning — and at a most attractive price, which includes the vernier reading to "tenths". Has solid drop forged frame; accurately marked, easy reading graduations; most sensitive, smooth handling due to the burnished micrometer thread, which compresses the metal for greater hardness and longer life. Other sizes to 6" with vernier to "tenths" on 1", 2" and 3" sizes. Also inside mikes, depth mikes, and a complete range of special micrometers.

Cut Inspection Costs With



ATLANTIC Adjustable Limit SNAP GAGES

Made on American Gage Design Committee specifications. Frames of Meehanite. Sizes from .195 to 11 5/8". With round or square gaging pins, solid anvil, extended anvil, etc. The last word in snap gages, and at most interesting prices. Write us for details — and about the Scherr service for trueing and setting worn gages.

**Write for full details on
these and other Scherr tools.**

GEO. SCHERR CO., Inc.

198 - Lafayette St. New York 12, N. Y.

Appointments & Promotions

R. G. Neilson has been named general manager of production and manufacturing for Mackintosh-Hemphill Co., Pittsburgh and Midland, Pa., it was announced by Col. J. S. Ervin, president.



R. G. Neilson



Bruce F. Olson

• • •

Bruce F. Olson was recently elected president and general manager of Sundstrand Machine Tool Co., Rockford, Ill. O. G. Nelson was elected chairman of the board. Gilmore J. Landstrom and Gust H. Ekstrom, directors of the firm, were elected vice presidents, and Howard H. Ekstrom was made assistant secretary and treasurer.

S. J. Mergenhagen has been appointed assistant sales manager of Heppenstall Company, Pittsburgh, and R. H. Musser succeeds him as district sales representative in Philadelphia; John P. Roche, vice president in charge of sales, said the new duties would be assumed on April 5th.

A recent announcement by E. E. Vally, Illinois Tool works sales manager tells of the appointment of Edward D. Wiard as company representative in the Detroit territory, beginning March 1st.

At the annual meeting of the Monorail Manufacturers' Association, recently held in Chicago, **A. F. Anjeskey**, sales manager of the Cleveland Tram-rail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, was



A. F. Anjeskey



Wilbur Mayer

• • •

elected president. **Wilbur Mayer**, sales manager of the Loudon Machinery Co., Fairfield, Iowa, was elected vice president; **E. Donald Tolles** was elected secretary-treasurer.

James W. Reynolds, former vice president and director of the Sun Chemical Co., New York, has joined the General Electric Company's Chemical Department as sales manager of silicone products, with headquarters at Waterford, N. Y., according to an announcement by **John A. Zellhoefer**, Chemical Division sales manager.

Appointment of **Stuart H. Smith** as Cincinnati district manager of SKF Industries, Inc., has been announced by **R. R. Zisette**, general sales manager. Named field representatives were: **C. N. Benson** and **D. B. Eden**, Boston; **A. R. Ehrnschwender**, Cincinnati; **J. T. Paradise**, Atlanta; **G. L. Hansen**, Portland, Oregon.

Russell J. Skinner has been appointed assistant district manager of the United States Steel Supply Co., St. Louis, a U. S. Steel warehousing subsidiary, **Lee F. Niemann**, district manager, has announced.



MACHINES TO BEND COLD PIPE, CONDUIT, BOILER TUBING AND SOLID BAR . . . BENDING TABLES ALSO AVAILABLE



Above: Hand powered Type A-30 . . . up to 180 bends . . . all sizes from 1/2" to 2".

Only 7 parts. World's fastest, simplest machine. Note assortment of bending dies . . . this process makes shorter tangents than any other. Occupies only 18" by 18" floor space!

Other Sizes Available

Factory and Main Office:

9 Furnace Street

Poultney, Vermont

RADIANT HEAT BENDS

For residential work—at 6" and 9" radius bends on 1/2" and 3/4" pipe.

For industrial sizes — at 6" and 9" radius bends on 1" and 1 1/4" pipe.

All the above bends and sizes are specified and accepted by most heating engineers and contractors.

Furnished as extras if required on our Type A-30.

"American"
PIPE BENDING MACHINE
Company INC.

The appointment of **C. Harold Phillips** as plant manager of the Fort Wayne plant is announced by Addison E. Holton, president of the Essex Wire Corporation.



C. Harold Phillips



Leslie McArthur

• • •

Frederick U. Conard, president and general manager of Niles-Bement-Pond Co., West Hartford, Conn. recently announced that **Leslie McArthur**, vice president, had been elected a member of the Board of Directors.

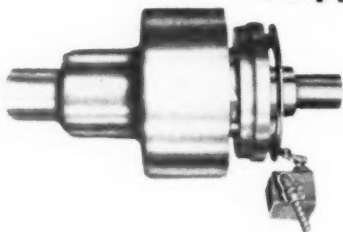
D. R. Simmons of the Elberta Crate and Box Company, Bainbridge, Ga., was re-elected president of the Wirebound Box Manufacturers Association at the group's annual meeting in New Orleans. **John R. Miller** of the T. R. Miller Mill Co., Inc., Brewton, Ala., was named vice president. **L. O. Crosby, Jr.** of the Goodyear Yellow Pine Co., Picayune, Miss., was elected a member of the Board of Directors.

The United States Precision Products Co., Inc., Shabbona, Ill., gage manufacturers, appointed **Hugo J. Hackla**, president, **Paul Kiersch**, vice president, **Robert Kelter** as secretary, treasurer and general manager, **A. Walt** as chief engineer; **W. K. Gallagher** was promoted to sales manager.

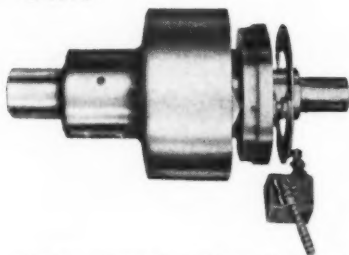
Vincent A. Schmidt, has joined the Nelson Stud Welding Division of Morton Gregory Corporation, Lorain, Ohio, as Field engineer, according to an announcement made by Leonard C. Barr, vice president and general sales manager.

BUFFALO *Torque Control* COUPLINGS

Transmission Type With Automatic Tripper Unit



Showing Coupling, Tripper Unit and Limit Switch in Full-Load Running Position.



Showing Coupling, Tripper Unit and Limit Switch in Shut-Down Position.

A Positive Safeguard for Both Motor and Driven Unit

The instant an overload develops the clutch in the Coupling releases; then the dual cam operating ring actuates the limit switch arm and shuts off the power to the motor. After the overload is released and the power turned on again, the Coupling is ready to continue full-load operation without any torque re-adjustment.

Send Today for Complete Bulletin No. 1012

Buffalo Machinery Co., Inc.

R38 GRANT ST.
BUFFALO 13, N. Y.

The appointment of **Harry S. Hagan** as manager of the Butler, Pa., freight car plant of Pullman-Standard Car Mfg. Co. was announced in Chicago recently by Norman B. Johnson, assistant executive vice president.

Kennametal, Inc., Latrobe, Pa. announce the appointment of **C. Russell Miller** as service engineer working out of the Cincinnati office; **Henry B. Worthington** as sales engineer, working out of the Springfield, Mass. office; **Thomas J. Kniff, Jr.**, as application engineer, working out of the Philadelphia office.

The **Elmer W. Pfiel Co., Inc.** has been appointed as manufacturer's representative for the Anker-Holth Manufacturing Co., Port Huron, Mich., in the Cleveland and Pittsburgh territories.

Billings & Spencer Company, Hartford, Conn., announce the appointment of **Robert J. Huelsman** to the sales department of their Chicago office.

Louis C. Edgar, Jr. has taken over the duties as president of the **E. W. Bliss Company**; he will make his headquarters at the Toledo Works.



Louis C. Edgar, Jr.



Newman L. Smith

Newman L. Smith was recently elected president of the Airquipment Company, Burbank, Calif., and of its wholly owned subsidiary, Aerol Co., Inc. Smith is a director of both companies, wholly owned subsidiaries of Lockheed Aircraft.

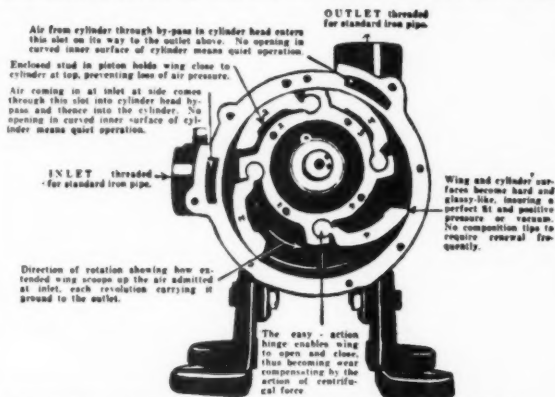
AIR PRESSURE or VACUUM

for Air Motors . . . Gas Boosters . . . Paper Feeders . . .
Bottle Fillers, Gas Furnaces, Atomizing and All Auto-

matic move-
ments.

ON TRIAL

Leiman Bros.
Patented Vacuum
Rotary Air Pumps
Pressure
Take Up Their
Own Wear



LEIMAN BROS. 169-1 CHRISTIE STREET NEWARK, N. J.
MAKERS OF GOOD MACHINERY FOR 50 YEARS



**SUPERFINISHED I. D.'s
of UNIVERSAL DRILL
BUSHINGS wear longer—
save you money**

**UNIVERSAL
ENGINEERING
COMPANY**

***FRANKENMUTH
IO, MICHIGAN**



F. E. Baker has been appointed manager of the Specialty Transformer Department in the Westinghouse Transformer Division, Sharon, Pa., it was announced by J. K. Hodnette, vice president in charge of the transformer division.

Russell F. Stuart, for 13 years head of Kearney & Trecker's Eastern U.S. sales activities, was appointed sales manager for the company's Walker-Turner division, Plainfield, N. J., according to a recent announcement made by R. W. Burk, vice president in charge of sales of K & T.

R. W. (Pat) Murphey has been designated advertising manager, Taylor Forge & Pipe Works, with general offices and main plant in Chicago.

Abdite Gauge Company, Dearborn, Mich., elected the following new officers: **Arnold Kaiander**, president; **Steven Coloske** and **Oliver Laszlo**, vice presidents; **Stanley Czarnik**, secretary and treasurer.

Weddell Tools Inc., Rochester, N. Y. have announced the appointment of **George Grantham** as chief tool engineer.



George Grantham



James F. Ednie

James F. Ednie, former chief metallurgist for Duquesne Smelting Corp., Pittsburgh, is now associated with National Carbide Die Co., and its subsidiary, the Penn Carbide & Alloy Casting Co., McKeesport, Pa., as sales manager.

The appointment of **C. H. Bartlett** as manager of power transformer sales of the Westinghouse Transformer Division, Sharon, Pa., has been announced.

It's got a "pull!"



Model No. 221
\$985.00
 Standard Drive

Model No. 224—variable speed drive—\$1175.
 Other lathes from \$264 up. Prices without taper attachment.

The drive of the Series 200 Clausing Lathes will pull your load. It is soundly engineered from the motor to the lathe spindle. It is this design that gives it an advantage. Speed changing is done at the point where there is a torque advantage. After the speed change station the power goes directly to the headstock spindle through a twin belt drive. No power can be lost after it has utilized its torque advantage. Then there are the usual back gears for your slow heavy pulls. For further details write for circular.

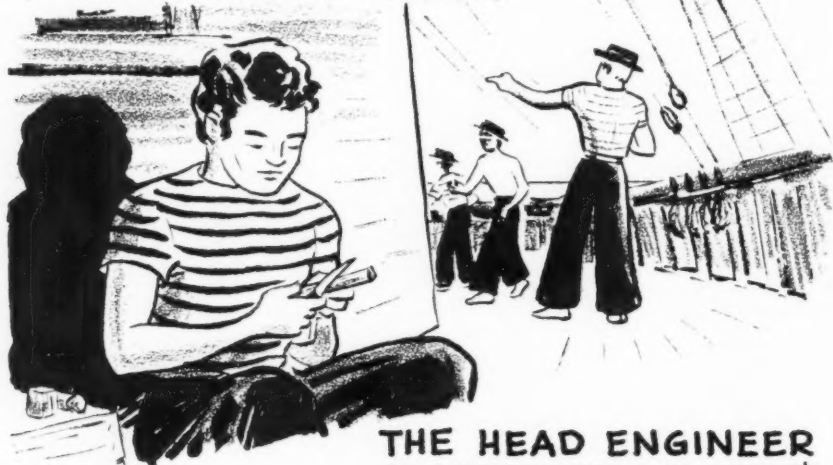
CLAUSING MANUFACTURING CO
231 RICHMOND AVE., OTTUMWA, IOWA

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323

Mechanics Through The Ages

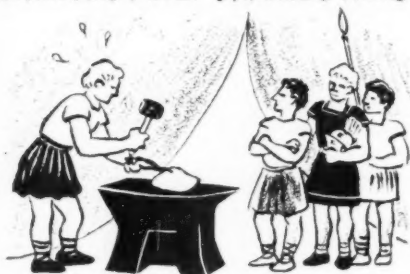
AT THE AGE OF 14, SAMUEL COLT, FAMED SMALL ARMS INVENTOR AND MANUFACTURER, CARVED OUT OF WOOD THE FIRST MODEL OF HIS REVOLVING BARREL PISTOL, WHILE SAILING BEFORE THE MAST ON A VOYAGE TO INDIA.

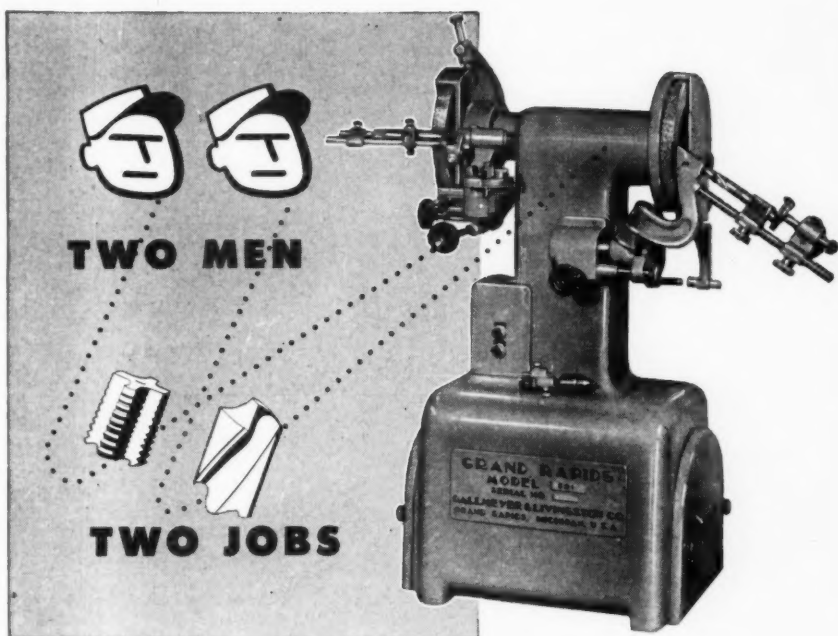


THE HEAD ENGINEER OF A ROMAN LEGION IN CAESAR'S TIME WAS A BUSY MAN. HE NOT ONLY HAD TO BUILD BRIDGES AND SUPERVISE MINING, BUT ALSO WAS OBLIGED TO KEEP WAR ENGINES IN REPAIR AND FIX UP DAMAGED ARMOR.



IN ANCIENT GREECE, LYSIUS AND HIS BROTHER POLEMACHUS PUT 120 SLAVES TO WORK TURNING OUT SHIELDS IN A FACTORY.





ONE MACHINE

● Working simultaneously, these men save time, floor space and maintenance costs in your tool room. Providing them with the facilities of two single-purpose machines, the Grand Rapids Tap and Drill Grinder accurately sharpens worn taps and drills to the correct cutting and clearance angles required for precision work. The rigid spindle is ruggedly built to resist heavy combined radial and thrust loads, and large wheel guards and flanges insure maximum safety. Grinding surfaces are dressed by a new, diamond truing device. The long life of this machine is assured by Grand Rapids' widely recognized reputation for sturdy, heavy-duty construction.

To serve you — Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter Grinders, Hand Feed Surface Grinders, and Combination Tap and Drill Grinders.



GRAND RAPIDS GRINDERS

405 STRAIGHT AVE., S.W., GRAND RAPIDS 4, MICHIGAN

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WHATEVER YOU NEED, YOU'LL FIND IT HERE

Compiled for quick reference and for your convenience, this handy index of products shows the pages on which you will find the items advertised in this issue. When writing to advertisers it will be appreciated if you will mention **MACHINE and TOOL BLUE BOOK**.

In the event you are unable to find the product or equipment you need, please write us and we'll be glad to supply the information. No obligation. Hitchcock Publishing Company, 222 East Willow Ave., Wheaton, Illinois.

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Simplify and **SPEED-UP** Drilling and Centering Operations...



By Using Power Feed and Power Clamping

You'll get fast, accurate drilling or centering on one or both ends of work pieces with the Sundstrand 53A Drilling and Centering Machine. It has four possible spindle speeds which are quickly and easily obtained by interchanging pulleys and vee belts.

The 53A Drilling and Centering Machine is usually furnished with power feed and power operated vises. Hand control for feed and manually operated

The Sundstrand 53A Drilling and Centering Machine above handles work up to 4" dia. by 24" long. Longer bed machines are also available for maximum lengths of 48 or 72 inch work pieces.

vises can also be furnished or a combination of power feed and hand operated vises or manual feed and power operated vises. When provided with power operated vises, operator can clamp long work near each end from one central push button station.

Hand feed and power operated vises are available at lower cost. Investigate these time-saving machines today.

FREE DATA

This bulletin contains complete specifications and data on this modern Sundstrand Drilling and Centering Machine. Complete specifications for both power and hand feed machines are included. Write for your copy today. Ask for bulletin 483.

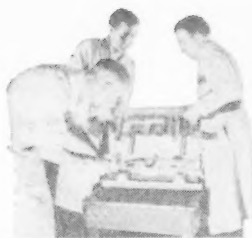


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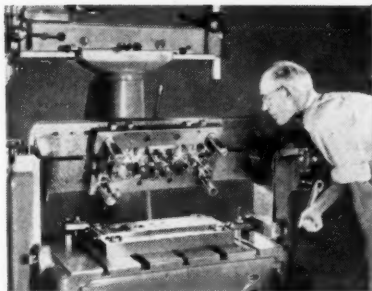
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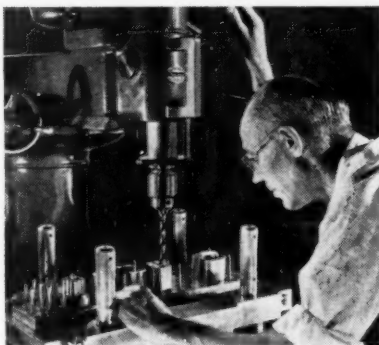
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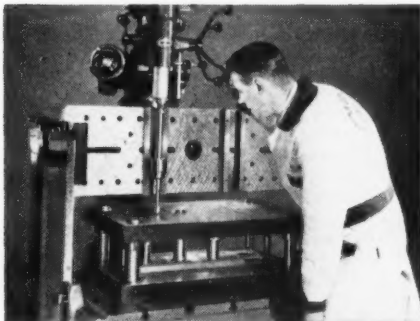
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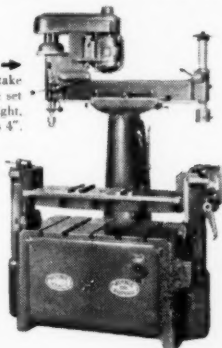
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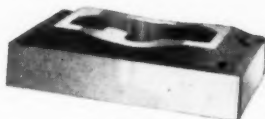
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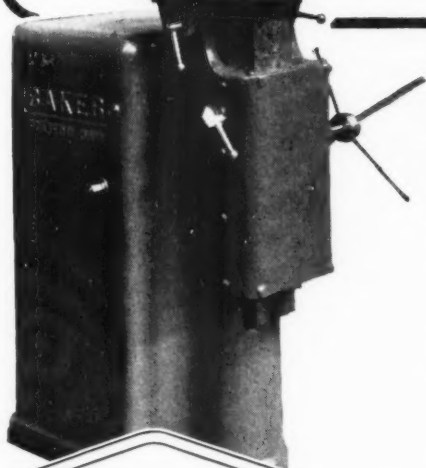
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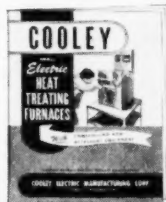


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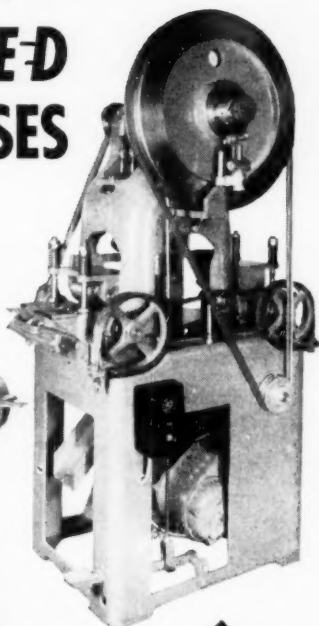
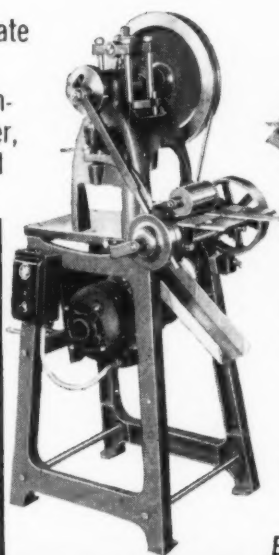
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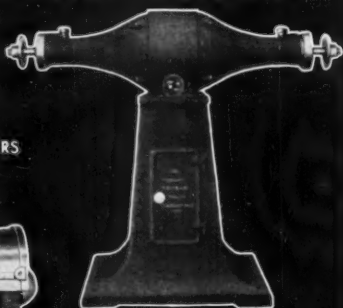
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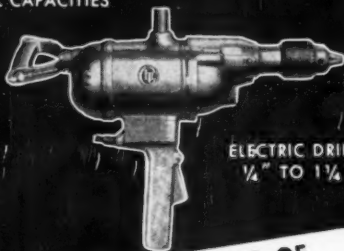
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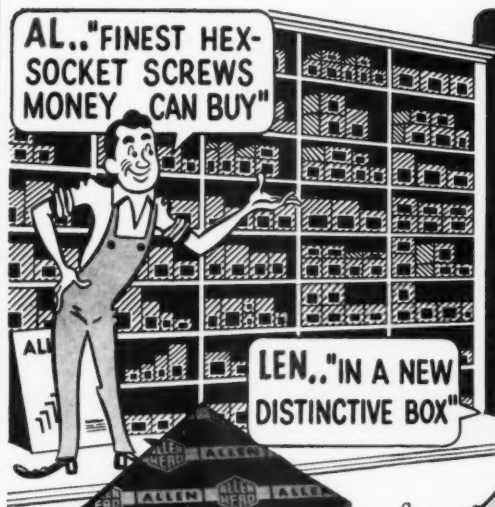
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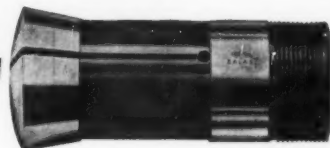
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